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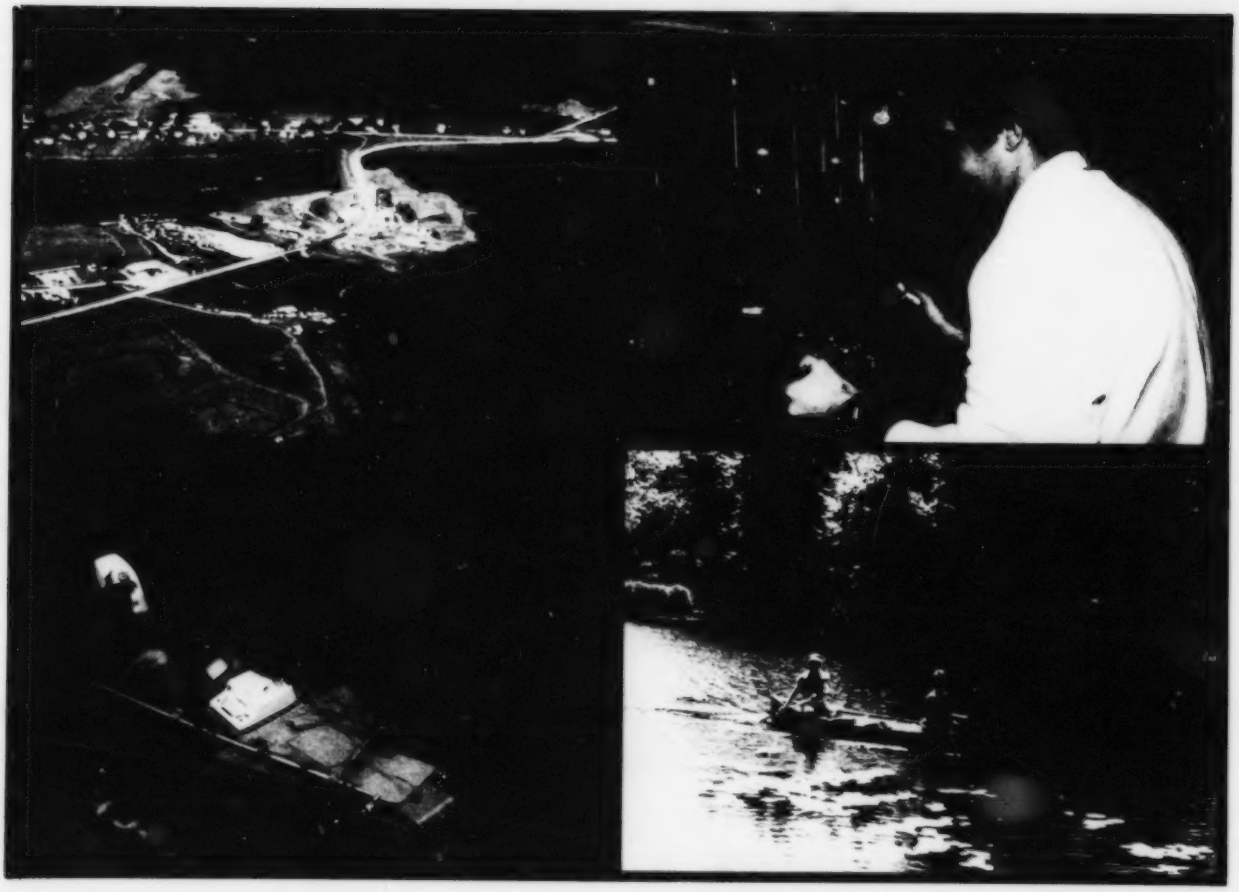
1990 ST. CROIX RIVER WATER QUALITY REPORT

IWD-AR-WQB-91-173



Canada

INLAND WATERS DIRECTORATE
ATLANTIC REGION
WATER QUALITY BRANCH
MONCTON, NEW BRUNSWICK

1990 ST. CROIX RIVER WATER QUALITY REPORT

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Conservation and Protection

Inland Waters Directorate

Water Quality Branch

Atlantic Region

Moncton, New Brunswick

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ABSTRACT

This report presents the 1990 results of the 1990 St. Croix River water quality monitoring program. Physical parameter values, major ion, nutrient and heavy metal concentrations are given for three sampling stations for the period from January to December, 1990. Provisional data from the Milltown Automatic Water Quality Monitor (AWQM) are also presented for the period from January to December, 1990. The established water quality objectives for dissolved oxygen and pH were met on all occasions.

Résumé

Ce rapport présente les résultats du programme de surveillance continue de la qualité des eaux de la rivière Sainte-Croix pour 1990. Les résultats d'analyse des paramètres physiques, ainsi que les concentrations mesurées d'ions principaux, de métaux lourds et d'éléments nutritifs sont présentés pour la période de janvier à décembre 1990. Des données provisoires provenant d'un enregistreur automatique de la qualité des eaux installé à Milltown sont aussi présentées pour la période de janvier à décembre 1990. Les valeurs de pH et d'oxygène dissous ont toutes rencontrées les objectifs établis de la qualité des eaux.

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1. INTRODUCTION

The St. Croix River and its tributary, Monument Brook, have a reach of approximately 124 km and form the international boundary between the Canadian Province of New Brunswick, and the American State of Maine. In the upper 110 km of the St. Croix River, the water quality is subjected to limited anthropogenic influence and is considered to represent background conditions. The region of concern in this study is a 14 km stretch between Woodland, Me. and Milltown, N.B. which is the mixing zone of a major industrial discharge from the Georgia-Pacific Kraft Pulp Mill at Woodland, Me.

The International Advisory Board on Pollution Control in the St. Croix was established by the International Joint Commission (IJC) in 1962 to coordinate water quality planning and management efforts in the basin. To assist the Board in fulfilling its mandate, the Water Quality Branch conducts systematic water quality sampling and assessment at three sites in the international portion of the river. The St. Croix River at the Kellyland station is considered to be pristine and indicative of background water quality whereas the Woodland station is located 200 m below the Georgia-Pacific Pulp Mill effluent outfall and serves to characterize the chemical composition of the effluent after a slight dilution by river water. The Milltown station, 14 km below Woodland provides information on the river water quality after assimilation and dilution of the pulp mill effluent by the river. Sampling station location descriptions are presented in Table 1 and plotted in Figure 1. The samples are analyzed for physical parameters, major ions, nutrients and trace metals.

The Water Quality Branch, in cooperation with the United States Geological Survey (USGS), also collects real-time data for temperature, specific conductance, pH and dissolved oxygen via satellite retransmission from an automatic water quality monitor (AWQM) at Milltown, Me. Similarly, river discharge data are collected at the USGS gauging station at Baring, Me.

These data are used to monitor compliance with established Water Quality Objectives and will be used for the future development of other water quality objectives for the St. Croix River Basin. In 1961, water quality objectives were formulated with the stated goal of restoration of anadronomous fish runs, in particular, Atlantic Salmon (Salmo salar). Objectives for dissolved oxygen and pH (5.0 mg/L and 60% saturation and 6.0 to 8.5 pH units respectively) were established. By 1978, improvements in the water quality of the lower 14 km stretch of the river had made possible the passage of Atlantic Salmon, and in 1980 a re-introduction program was started (Bailey, 1988b).

This report assesses the water quality data from three sampling stations in the St. Croix River Basin during the period of January to December 1990. It also includes the AWQM data for the period of January 1990 to December 1990.

Previous St. Croix River Water Quality reports include Clair (1980), Lockerbie and Cullen (1981), Howell and Lockerbie (1983; 1984), Howell (1985), Lockerbie (1987), Bailey (1988a, 1989, 1990).

2. METHODOLOGY

Environment Canada, Water Resources Branch technicians collected samples from the St. Croix River on nine occasions (every six weeks ± 1 week) between January 25, 1990 and December 11, 1990 at three sites in the river basin - Kellyland, Woodland, and Milltown.

Water quality sampling was conducted as outlined in "Sampling for Water Quality" (Environment Canada, 1983) and the analytical methods employed are described in the NAQUADAT Dictionary (Environment Canada, 1986). Preservation of metals and phosphorus in the field was discontinued in 1988 in favour of laboratory preservation (Bailey, 1989). Water quality parameters, analyzed for the St. Croix River, are listed in Table 2 along with their NAQUADAT codes and detection limits.

Water Quality Branch, Atlantic Region, quality control procedures require that at least 15% of the samples be collected in triplicate and distilled water trip blanks are prepared on each sampling occasion (Arseneault, et al., 1985). Only one value for the triplicate samples, which have been included in the tables, was used in the preparation of the boxplots in order to eliminate bias for those sampling dates. This value was the mean of the triplicate samples.

The grab sample data will be compared to the two water quality objectives, that have been established for the St. Croix River Basin. They stipulate that the dissolved oxygen concentration shall be at least 60% saturation or 5.0 mg/L whichever is greater and that the pH of the waters shall be in the range of 6.0 to 8.5 units. Data for other selected parameters will also be compared to the Canadian Water Quality Guidelines for the protection of freshwater aquatic life. These guidelines are listed in Table 3.

The hourly data from the USGS AWQM at Milltown were obtained by using a Labarge GOES satellite retransmission platform. In this report, data are listed in daily format with minimum, maximum and

mean. In addition to the measured parameters, percent dissolved oxygen saturation have been calculated, and are included in Appendix I.

The river discharge data from the Baring gauging station have been similarly formatted and are included in the monthly tables. These data, however, are considered to be provisional, until published by the USGS.

3. RESULTS AND DISCUSSION

3.1 1990 Grab Sample Data versus Water Quality Objectives

As a result of the small number of samples collected during the sampling period, this report will be primarily a presentation of the data with minimal interpretation of the data. The grab sample data for physical parameters and major ions, metals and nutrients are provided in Tables 4 to 6 respectively.

The 1990 Water Quality Branch grab sample data for dissolved oxygen are illustrated in box and whisker plots in Figures 2 and 3. Figure 2 indicates that dissolved oxygen concentrations for the grab samples were above the established Water Quality Objectives of 5 mg/L with median values in the 9 to 11 mg/L range as compared to the 8 to 9 mg/L range in 1989 (Bailey, 1990). The increase in median values probably reflects a more regimented sampling frequency during 1990 as compared to 1989 when more samples were collected in the summer when values were lower.

The lovest dissolved oxygen concentration observed was 5.8 mg/L for triplicate samples at Woodland on July 5. The recorded lov for Milltown was 7.4 mg/L on August 22.

The median values for the three stations ranged from 90 to 97 percent saturation (Figure 3). In terms of percent saturation, the minimum value observed was 66 percent at Kellyland on December 11.

The pH values met the vater quality objective of 6.0 to 8.5 at all sites as illustrated in Figure 4.

3.2 Provisional AWQM data versus the Water Quality Objectives

According to the monthly data summary sheets (Appendix I), no dissolved oxygen concentrations fell below the vater quality objective of 5.0 mg/L in 1990. Median values for July, August and September

were 7.0, 6.9 and 7.8 mg/L respectively (Figure 5). The minimum daily mean value was reported on August 14 at 6.6 mg/L. On the same date, the minimum hourly value was 6.3 mg/L.

The dissolved oxygen as percentage saturation, averaged 89 percent for the three month period. Data were not received in Moncton for the period from July 21 to August 12 due to pump and Data Collection Platform (DCP) malfunctions. Data, for this period, were extracted from the USGS update sheets.

The monthly data sheets (Appendix I) also indicate that the pH values were within the 6.0 to 8.5 water quality objective range. For the most part, pH values were nearly neutral ranging from 6.8 to 7.0.

3.3 St. Croix River at Kellyland - Station No. 00NB01AR0013

Water temperature ranged from 0.0°C on December 11 to 22.0°C on August 22. Dissolved oxygen concentrations ranged from 8.2 mg/L (96% saturation) on August 22 to 13.6 mg/L (98% saturation) on January 25. Laboratory measured pH ranged from 6.3 to 7.0 for the sampling period. The apparent colour was between 20-60 Hazen units with a median value of 40.

The background waters of the St. Croix River are dilute, with specific conductance ranging from 27 to 35 µS/cm. The dominant cation is calcium followed by sodium, magnesium and potassium. The anions are dominated by bicarbonate followed by sulphate and chloride.

Concentrations of copper, lead, mercury and cadmium were below the limit of detection in all samples collected. Extractable iron values were below the Canadian Water Quality Guidelines for the protection of freshwater aquatic life of 0.3 mg/L (as total iron) ranging from 0.09 to 0.22 mg/L.

The Canadian Water Quality Guidelines for metals are expressed as total metals, i.e. the sample has been digested in strong acid to

dissolve the silicate matrix present in the water so that the total metal has been accounted for. The Water Quality Branch, Atlantic Region, performs extractable metal analysis using a weak acid which measures only metals dissolved or adsorbed to particulate matter. In this region, total and extractable compare well because of the low suspended sediment load. A sample with a higher sediment load, as indicated by turbidity, will not have a good relationship between total and extractable metals.

There is no Canadian Water Quality Guideline for the protection of freshwater aquatic life for manganese. At the Kellyland sampling station, manganese was slightly above the detection limit ranging from 0.01 to 0.04 mg/L. Aluminum values ranged from 0.033 to 0.110 mg/L meeting the Canadian Water Quality Guideline of 0.100 mg/L for waters where the pH is greater than 6.5 pH units, with the exception of 2 samples of a triplicate which slightly exceeded the guideline with a value of 0.110 mg/L.

Nutrient concentrations were low at Kellyland with nitrate nitrogen and total nitrogen ranging from <0.01 to 0.07 and 0.12 to 0.26 mg/L respectively. Total phosphorus ranged from 0.005 to 0.015 mg/L while dissolved organic carbon ranged from 5.5 to 9.5 mg/L.

3.4 St. Croix River at Woodland - Station No. 00NB01AR0014

Samples at this site are collected in the effluent plume and serve to characterize the chemical composition of the effluent after slight dilution by river water.

The temperature of the St. Croix River at the Woodland station is primarily due to the effluent temperature and thus remains high throughout the year (12 to 31°C). The lowest dissolved oxygen concentration recorded was 5.8 mg/L representing 78 percent saturation on July 5. pH was slightly higher (7.0-7.6 units) at Woodland as compared to Kellyland due to the alkaline nature of the Kraft effluent. The apparent color was greater than 1000 Hazen units on all

occasions from January to May, however, dropped to G500 to 800. from July to December. Nonfilterable residue (suspended solids) ranged from 11 to 52 mg/L with a median of 31, a notable decrease from 1989 when they ranged from 32 to 97 with a median of 63. Values at Kellyland are normally less than the detection limit of 10 mg/L.

The specific conductance at Woodland was approximately 70 times higher than the background station. There is also a change in the major ion chemistry. Whereas at Kellyland, the cation and anion dominance were Ca>Na>Mg>K and HCO_3>SO_4>Cl respectively, sodium strongly dominates the cations followed by Ca>K>Mg (Table 7) at Woodland. Similarly chloride dominates the anions with sulphate and bicarbonate nearly proportional. This shift in ion dominance is a result of the Kraft process.

Mercury and cadmium were below or at their respective detection limits while copper (0.002 to 0.004 mg/L) and lead (<0.002 to 0.005 mg/L) were slightly above the detection limit. The Canadian Water Quality Guidelines for copper and lead are dependent on water hardness. At Woodland, the hardness varies from hard to very hard, therefore the guidelines for copper and lead would range from 0.004 to 0.006 mg/L and 0.004 to 0.007 mg/L respectively. Iron and manganese concentrations ranged from 0.35 to 0.76 mg/L and 0.44 to 2.00 mg/L respectively. By comparing the median values for iron and manganese, it indicates that the 1990 values are 20-25% lover than 1989. Extractable aluminum concentrations remain high (0.9 to 3.5 mg/L), which probably results from the use of alum in process water treatment at the mill. However, these values also reflect a decrease of approximately 70% as compared to 1989.

Although iron and aluminum concentrations greatly exceed the water quality guidelines of 0.3 and 0.1 mg/L respectively, the highly organic nature of the effluent would suggest the metals are bound to the organic matter and therefore not readily available to aquatic organisms.

The organic nature of the Kraft Mill effluent is also reflected in the elevated concentrations of nutrients. In 1990, dissolved organic carbon (DOC) values ranged from 25 to 71 mg/L with a median of 45. This represents an approximate 25% decrease (based on median values) from the previous year when DOC ranged from 23 to 71 mg/L with a median of 61. In 1988, DOC ranged from 59 to 152 mg/L.

A new recovery boiler, which burns organic by-products, was put into operation August 1989, and has probably contributed to the decline in values of DOC and a number of other parameters. Apparent color values for the second half of 1990 fell below the normal expected value of G1000, recording values of 640 to 800. Non-filterable residue values at Woodland in 1990 indicated a greater than 50 percent reduction in 1990 as compared to 1989. Values ranged from 11 to 52 mg/L with a median of 31 in 1990 as compared to 33 to 97 mg/L with a median of 70 in 1989.

The grab sample data for dissolved oxygen do not reflect similar improvements in dissolved oxygen for the period due to the sampling frequency, however, the AWQM data do indicate improvement in one area. According to the daily AWQM summary sheets, the dissolved oxygen sag normally associated with the high temperature and low discharge in August did not occur for the period of record in 1990. The dissolved oxygen as percent saturation in August 1990 of 87 was just slightly lower than the value of 88% saturation observed in July (Figure 6). The D.O. values in August ranged from 84 to 89 as percent saturation. In 1989, values ranged from 72 to 88 as percent saturation with a median of 78.

In addition to the decline in DOC as discussed above, nitrate nitrogen and total nitrogen also showed notable decreases. Nitrate nitrogen and total nitrogen values ranged from 0.86 to 5.30 mg/L and 0.97 to 7.20 mg/L respectively in 1990. This represents a 20 to 25% reduction based on median values as compared to 1989. An anomalous value for nitrate nitrogen on March 8 and one for total nitrogen in

December (Table 6) could not be explained and were not used for determination of range and medians.

Total phosphorus determinations which were not usually done at this station due to analytical interferences, were completed in 1990. Values ranged from 0.3 to 0.7 mg/L.

3.5 St. Croix River at Milltown - Station No. 00NB01AR0001

Fourteen kilometres downstream from Woodland at Milltown, the effluent plume appears to be incorporated into the river water and there is little indication of any horizontal differentiation in water quality (Hovell and Lockerbie, 1983). This station provides information on the river water quality after assimilation of the pulp mill effluent by the river.

Water temperatures (0.0 to 23.0°C) were similar to the background station at Kellyland. Apparent color at Milltown ranged from 40-80 Hazen units which represents only a slight increase over the values at Kellyland. A comparison of the median values for color at Milltown indicates that the 1990 values are approximately 40 percent lower than in 1989. Dissolved oxygen exceeded the water quality objectives of 5.0 mg/L and 60% saturation on all occasions. It ranged from 7.4 to 12.8 mg/L and 70 to 106 percent saturation. These data do not reflect the improvements previously discussed for the Woodland station primarily due to program design (sampling frequency of 6 weeks).

Major ion chemistry at Milltown reflects a mixture of the background calcium bicarbonate dominated waters of the St. Croix River and the sodium chloride dominated pulp mill effluent. The specific conductance values were variable ranging from 44 to 146 µS/cm. Sodium was the dominant cation over calcium on all occasions. Bicarbonate was the dominant anion on seven of nine occasions, but was exceeded by chloride on the other two.

Copper, cadmium and mercury were not detected at Milltown. A single detection limit value for lead of 0.002 mg/L was slightly above the Water Quality Guideline for the protection of aquatic life of 0.001 mg/L for waters with a hardness of less than 60 mg/L ($CaCO_3$).

At Milltown, iron and manganese values ranged from 0.11 to 0.33 mg/L and 0.03 to 0.06 mg/L respectively. Until this year, iron and manganese concentrations at Milltown were approximately twice those found at Kellyland. However, improvements at Woodland have resulted in only slightly higher values at Milltown.

Extractable aluminum exceeded the Canadian Water Quality Guideline of 0.1 mg/L on 6 of 9 sampling occasions with values ranging from 0.083 to 0.150 mg/L. Although there was a decrease in the median value at Woodland in 1990, the median values for 1989 and 1990 were the same at Milltown.

Nutrient concentrations at Milltown are slightly higher than those observed at Kellyland. Total phosphorus ranged from 0.011 to 0.027 mg/L, nitrite-nitrate from <0.03 to 0.14 mg/L, total nitrogen from 0.19 to 0.35 mg/L and dissolved organic carbon ranged from 6.1 to 10.6 mg/L. Based on their respective median values, nitrate nitrogen, total nitrogen and phosphorus, decreased while DOC increased.

3.6 Milltown AWQM Data

The provisional AWQM data for the period from January to December 1990, and the provisional discharge data have been formatted into monthly data sheets and are provided for information only in Appendix I. It should be noted that the fourth column of each parameter represents the number of hours of data used in the calculations, hence the confidence that can be placed on the calculated values. Although data correction factors provided by the USGS for the AWQM at Milltown have been applied to the data on the monthly summary sheets, the data are nevertheless considered provisional.

Small blocks of data in April (2 days), May (5 days), July 23 days), and October (4 days) were discarded due to operational problems. The July failure was due to DCP problems.

Discharge data for the months of January and February were not received at Moncton. The Water Resources Branch receiving station at Downsview, Ontario did not receive the data due to non-alignment of the data collection platform (DCP) at Baring with the satellite.

Dissolved oxygen (mg/L) and discharge were plotted for the period from July to September in Figure 7. The graph was prepared using the data listed in the July to September monthly summary sheets. As with Figures 5 and 6, the data received in Moncton were supplemented with data collected from the period from July 21 to August 12.

Figure 7 indicates a rather moderate decline in mean dissolved oxygen values for a two-week period during mid-July. There was also a sharp drop in dissolved oxygen values as percent saturation during the same period (Figure 8). This indicates that the decline was probably triggered by the two-week low discharge rather than increasing temperatures. The dissolved oxygen values recovered quickly by the first of August, due to increased discharge and maintained levels of 7 mg/L and 85% saturation for the rest of the summer.

It is difficult to provide accurate comparison of one year's dissolved oxygen data to another due to variables such as fluctuating discharge, temperature and improvement to waste treatment, however the optimum is to maintain the best dissolved oxygen values under all conditions. The improvement in related parameters such as the decline in dissolved organic carbon and non-filterable residue at Woodland should result in a positive effect at Milltown.

Some improvements in dissolved oxygen were observed using the AWQM data. Figure 5, produced from the monthly summary sheets, indicates that the July values remained virtually the same as 1989, whereas the August and September median values increased 0.5 to 6.9

mg/L and 0.2 mg/L to 7.8 mg/L respectively, as compared to 1989. This may not appear to be a large increase, however discharge values were less than 30 cubic metres per second for the middle two weeks of July (Figure 7). Discharge values fluctuated greatly during the August/September period making it difficult to evaluate its relationship to the improved dissolved oxygen values at Milltown.

3.7 Quality Assurance/Quality Control

Quality Assurance and Quality Control procedures are implemented in all monitoring programs to ensure consistent, high quality data are being generated by field and laboratory personnel. The QA/QC program is essential to the credibility of the data so users can interpret the results with a high degree of confidence. In the 1990 International St. Croix River monitoring, a series of blanks and triplicates provide the QA/QC requirement. The sequential triplicate samples include the entire suite of parameters and provide an indication of sampling techniques, analytical precision and data management components. Trip blanks which are prepared in the laboratory and transported to the field and back unopened, are prepared to determine if the sample results have been influenced by contamination during transport or analysis.

Concurrent with these field procedures, the Water Quality Branch Laboratory also maintains an internal QA/QC process that includes control charts and ionic balance verifications, the use of internal laboratory reference materials and standard reference materials. The laboratory also participates in several interlaboratory round robins.

The triplicate sample results for the 1990 survey year are presented in Table 8. Historical analysis of triplicate data has indicated that total phosphorus and extractable aluminum have been highly variable and are therefore included in the QA/QC data analysis. Laboratory pH, dissolved chloride and dissolved organic carbon are included to represent the physical, major ion and nutrient parameter groups respectively. For each set of triplicate samples, the

arithmetic mean, standard deviation and coefficient of variation have been calculated. The coefficient of variation - C.V. (%) = Standard Deviation/Mean X 100, is used as a test statistic because this formula is independent of units and many analytical methods express precision in their manner. Arseneault and Hovell (1985) indicate that a rough guide for comparison of triplicate samples would be a reproducibility of results of less than 10 percent. Variation greater than 10 percent should be of concern if results are not close to the detection limit. Results near the analytical detection limit can commonly vary up to 50 percent. The coefficient of variation (%) for the selected parameters are in Figure 9.

If the median coefficient of variation is taken as the average variability among replicates for the sampling period, it is apparent that the measurement precision for the different parameters is as follows:

Laboratory pH $\pm$ 0.0%
Dissolved Chloride $\pm$ 3.5%
Dissolved Organic Carbon $\pm$ 2.0%
Total Phosphorus $\pm$ 9.0%
Extractable Aluminum $\pm$ 5.5%

These values indicate the average variation among replicate samples and although the triplicates are single grab samples, they will be used as a comparison to the 10 percent guideline of reproducibility. Since the values are less than 10 percent, the complete sample results are accepted as being representative of the body mass. However, since these single grab sample values are to be compared to an acute level, it is not the average variability of the data collection process, but the extremes of variability which are important. This variability is expressed as the range of the coefficient of variation (Figure 14).

Laboratory pH ± 2.0%
Extractable Aluminum ± 9.5%
Dissolved Chloride ± 4.0%
Dissolved Organic Carbon ± 6.0%
Total Phosphorus ± 48.0%

In the case of total phosphorus, the high variability between replicates may be caused by the inadequacy of single grab samples to fully represent a non-homogenous water mass, that is, the presence of suspended material.

Trip blanks values for extractable copper, zinc, cadmium, mercury, aluminum, manganese and dissolved aluminum were all below the detection limit for the analytical method employed (Table 9).

The triplicates and blank results indicate that the QA/QC procedures were sufficient and successful, and that the 1990 St. Croix River monitoring data can therefore be interpreted with confidence.

4. CONCLUSIONS

During the study period, from January to December 1990, the sampling sites were visited on nine occasions. Dissolved oxygen and pH were in compliance with the established Water Quality Objectives at all sites. Improvements in dissolved organic carbon, non-filterable residue, color, dissolved oxygen and a number of metals and nutrients were observed at the Woodland site which may be attributed to the new recovery boiler which began operation in August 1989. With the exception of dissolved organic carbon and non-filterable residue, some improvements in the above parameters were also reflected in the Milltown data.

The AWQM provisional data for the period from January to December, 1990 have been appended for information. These data have been corrected for technical errors with factors supplied by the USGS. The corrected AWQM data also met the Water Quality Objectives for both dissolved oxygen and pH. The AWQM data also show some improvement in dissolved oxygen at Milltown with August median values increasing from 6.4 to 6.9 mg/L.

RECOMMENDATIONS

The Water Quality Branch, Analytical Services Division, utilizes a methodology of colour (apparent colour - NAQUADAT Parameter Code - 02011L) which is not compatible to waters which contain pulp mill effluent. The State of Maine has also established standards (to become effective in 1993) for true colour in water.

It is the recommendation of the Advisory Board on Pollution Control in the St. Croix River that consistent methods for determining colour in river water are needed and that true colour would best conform with most needs (ABPC, 1990).

The Water Quality Branch has produced monitoring and compliance reports for the St. Croix River Basin since 1980. These reports have been focused on one or two years of monitoring data with little reference to preceding years. It is recommended that a 1980-1990 report for the St. Croix River Basin monitoring stations be produced, with emphasis on the temporal analysis of data. This may be in a SOE-style report attempting to answer the question, "Is the river water quality improving or being degraded?"

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TABLE 1

NAQUADAT IDENTIFICATION NUMBERS AND SITE DESCRIPTIONS OF STATIONS SAMPLED ON THE ST. CROIX RIVER

NAQUADAT No.	Site Description
00NB01AR0013	St. Croix River at Kellyland
00NB01AR0014	St. Croix River, 200 m below Woodland Mill on the U.S. side of the river.
00NB01AR0001	St. Croix River at Milltown International bridge - mid-river.

TABLE 2

LIST OF PARAMETERS, QUANTIFIED BY ENVIRONMENT CANADA WITH PARAMETER CODES AND DETECTION LIMITS

Parameter	NAQUADAT Code	Detection Limit
Water Temperature	02065S	--
Dissolved Oxygen (meter)	08102S	--
Specific Cond. (field)	02042S	2 µS/cm
pH (field)	10301F	-
Specific Cond. (lab.)	02041L	0.2 µS/cm
pH (lab)	10301L	--
Colour	02011L	--
Turbidity	02073L	--
Calcium	20110L	0.040 mg/L
Sodium	11103L	0.10 mg/L
Potassium	19103L	0.10 mg/L
Magnesium	12107L	0.005 mg/L
Chloride	17209L	0.100 mg/L
Sulphate	16304L	1.00 mg/L
Total Alkalinity	10101L	0.5 mg/L
Extractable Iron	26304L	0.050 mg/L
Extractable Manganese	25304L	0.010 mg/L
Extractable Copper	29305L	0.002 mg/L
Extractable Lead	82302L	0.002 mg/L
Extractable Mercury	80315L	0.02 µg/L
Extractable Aluminum	13305L	0.002 mg/L
Extractable Cadmium	48302L	0.001 mg/L
Total Phosphorus	15413L	0.005 mg/L
Total Nitrogen	07601L	0.025 mg/L
Nitrate + Nitrite N.	07110L	0.002 mg/L
Dissolved Organic Carbon	06107L	0.4 mg/L

TABLE 3

WATER QUALITY GUIDELINES FOR FRESHWATER AQUATIC LIFE AS TOTAL METALS (CCREM, 1987)

Parameter	Guideline	Comments
Aluminum	0.005 $mg.L^{-1}$	$pH<6.5$; $(Ca^{2+})<4.0$ $mg.L^{-1}$; $DOC<2.0$ $mg.L^{-1}$
	0.1 $mg.L^{-1}$	$pH\geq6.5$; $(Ca^{2+})\geq4.0$ $mg.L^{-1}$; $DOC\geq2.0$ $mg.L^{-1}$
Arsenic	0.05 $mg.L^{-1}$	
Cadmium	0.2 $\mu g.L^{-1}$	Hardness 0-60 $mg.L^{-1}$ ($CaCO_3$)
	0.8 $\mu g.L^{-1}$	Hardness 60-120 $mg.L^{-1}$ ($CaCO_3$)
	1.3 $\mu g.L^{-1}$	Hardness 120-180 $mg.L^{-1}$ ($CaCO_3$)
	1.8 $\mu g.L^{-1}$	Hardness > 180 $mg.L^{-1}$ ($CaCO_3$)
Copper	2 $\mu g.L^{-1}$	Hardness 0-60 $mg.L^{-1}$ ($CaCO_3$)
	2 $\mu g.L^{-1}$	Hardness 60-120 $mg.L^{-1}$ ($CaCO_3$)
	4 $\mu g.L^{-1}$	Hardness 120-180 $mg.L^{-1}$ ($CaCO_3$)
	6 $\mu g.L^{-1}$	Hardness > 180 $mg.L^{-1}$ ($CaCO_3$)
Iron	0.3 $mg.L^{-1}$	
Lead	1 $\mu g.L^{-1}$	Hardness 0-60 $mg.L^{-1}$ ($CaCO_3$)
	2 $\mu g.L^{-1}$	Hardness 60-120 $mg.L^{-1}$ ($CaCO_3$)
	4 $\mu g.L^{-1}$	Hardness 120-180 $mg.L^{-1}$ ($CaCO_3$)
	7 $\mu g.L^{-1}$	Hardness > 180 $mg.L^{-1}$ ($CaCO_3$)
Zinc	0.03 $mg.L^{-1}$	

TABLE 4

PHYSICAL PARAMETERS AND MAJOR ION CONCENTRATIONS (mg/L)

FOR THE ST. CROIX RIVER STATIONS AT KELLYLAND, HOODLAND AND MILLTOWN

0	1 STN	2 SDATE	3 STIME	4 SUBID	5 02061 TEMP (DEG.C.)	6 00102 DO (MG/L)	7 DO % SAT	8 pH FIELD (UNITS)	9 pH LAB (UNITS)	10 SP COND FIELD (uS/CM)	11 SP COND LAB (uS/CM)
1	00NB01AR0013	25-JAN-90	1230	145	1.0	13.6	98	6.12	7.0	33.0	37.0
2	00NB01AR0013	08-MAR-90	1145	145	1.0	11.6	84	6.90	6.8	34.2	35.0
3	00NB01AR0013	10-APR-90	1045	T145	3.5	12.8	99	6.55	6.5	24.8	26.9
4	00NB01AR0013	10-APR-90	1047	T145	3.5	12.8		6.34	6.6	25.0	26.8
5	00NB01AR0013	10-APR-90	1049	T145	3.5	12.8			6.5	24.9	26.8
6	00NB01AR0013	22-MAY-90	1201	145	10.0	10.6	97	6.95	6.5	28.6	28.3
7	00NB01AR0013	05-JUL-90	930	- 145	22.0	6.8	80	7.11	6.6	27.9	29.3
8	00NB01AR0013	22-AUG-90	1201	T145	22.0	8.2	96	6.75	6.7	31.2	30.0
9	00NB01AR0013	22-AUG-90	1210	T145	22.0	8.2	96	6.64	6.7	30.5	29.7
10	00NB01AR0013	22-AUG-90	1220	T145	22.0	8.2	96	6.66	6.7	30.4	30.5
11	00NB01AR0013	25-SEP-90	818	T145	14.0			6.79	6.8	27.5	31.0
12	00NB01AR0013	25-SEP-90	815	T145	14.0			6.81	6.8	26.4	34.0
13	00NB01AR0013	25-SEP-90	821	T145	14.0			6.79	6.8	28.6	31.0
14	00NB01AR0013	06-NOV-90	1340	145	4.0	12.6	99	7.65	6.5	31.5	34.0
15	00NB01AR0013	11-DEC-90	1300	T145	0.0	9.4	66	6.80	6.4	28.4	30.0
16	00NB01AR0013	11-DEC-90	1305	T145	0.0	9.4	66	6.80	6.3	27.0	30.0
17	00NB01AR0013	11-DEC-90	1310	T145	0.0	9.4	66	6.70	6.4	27.0	30.0
18											
19											
20	00NB01AR0014	25-JAN-90	1342	T145	16.0	8.8	92	8.08		3200.0	
21	00NB01AR0014	25-JAN-90	1344	T145	16.0	8.8	92	8.10		3200.0	
22	00NB01AR0014	25-JAN-90	1340	T145	16.0	8.8	92	8.08	7.4	3200.0	2500.0
23	00NB01AR0014	08-MAR-90	1300	145	18.0	8.0	87	7.80	7.3	1898.0	2120.0
24	00NB01AR0014	10-APR-90	1240	145	15.0	9.4	96		7.6	1445.0	1560.0
25	00NB01AR0014	22-MAY-90	1300	T145	23.5	8.6	106	7.68	7.2	2178.0	2150.0
26	00NB01AR0014	22-MAY-90	1310	T145	23.5	8.8	106	7.71	7.2	2167.0	2180.0
27	00NB01AR0014	22-MAY-90	1320	T145	23.5	8.8	106	7.72	7.3	2145.0	2180.0
28	00NB01AR0014	05-JUL-90	935	T145	31.0	5.8	78	7.59	7.3	1740.0	1830.0
29	00NB01AR0014	05-JUL-90	945	T145	31.0	5.8	78	7.60	7.3	1785.0	1860.0
30	00NB01AR0014	05-JUL-90	950	T145	31.0	5.8	78	7.64	7.3	1782.0	1840.0
31	00NB01AR0014	22-AUG-90	1325	145	31.0	7.2	97	7.06	7.3	1790.0	
32	00NB01AR0014	25-SEP-90	1030	145	20.0			6.55	7.4	710.0	800.0
33	00NB01AR0014	06-NOV-90	1340	145	21.0	9.2	103		7.0	1628.0	1970.0
34	00NB01AR0014	11-DEC-90	1345	145	12.0	9.8	94	7.20	7.1	1716.0	1940.0
35											
36											
37	00NB01AR0001	25-JAN-90	1430	145	0.0	12.8	90	8.12	6.9	173.0	146.0
38	00NB01AR0001	08-MAR-90	1340	T145	0.5	9.8	70	7.30	6.9	63.2	63.0
39	00NB01AR0001	08-MAR-90	1345	T145	0.5				6.9		63.0
40	00NB01AR0001	08-MAR-90	1350	T145	0.5				6.8		62.0
41	00NB01AR0001	10-APR-90	1400	145	4.0	12.8	101		6.6	41.4	44.2
42	00NB01AR0001	22-MAY-90	1420	145	10.0	11.6	106	7.62	6.7	53.8	52.0
43	00NB01AR0001	05-JUL-90	1300	145	23.0	7.8	93	7.22	6.9	89.8	89.5
44	00NB01AR0001	22-AUG-90	1400	145	22.0	7.4	87	6.68	7.0	73.2	71.0
45	00NB01AR0001	25-SEP-90	1201	145	15.0			6.31	6.9	56.1	58.0
46	00NB01AR0001	06-NOV-90	1545	T145	5.0	12.2	98	7.21	6.5	60.8	66.5
47	00NB01AR0001	06-NOV-90	1550	T145	5.0	12.2	98	7.12	6.5	64.2	67.0
48	00NB01AR0001	06-NOV-90	1540	T145	5.0	12.2	98	7.24	6.7	65.6	66.5
49	00NB01AR0001	11-DEC-90	1201	145	0.0	10.3	72	6.90	6.6	51.2	51.0

TABLE 4

PHYSICAL PARAMETERS AND MAJOR ION CONCENTRATIONS (mg/L)

FOR THE ST. CROIX RIVER STATIONS AT KELLYLAND, WOODLAND AND MILLTOWN

0	12 02011 COLOR (UNITS)	13 02073 TURB (JTU)	14 10101 T ALK (MG/L)	15 20110 Ca (MG/L)	16 12107 Mg (MG/L)	17 19103 K (MG/L)	18 11103 Na (MG/L)	19 16304 SO4 (MG/L)	20 16309 SO4 (MG/L)	21 17209 Cl (MG/L)	22 10401 NF RES (MG/L)	
1	35	0.6	8.4	4.2	0.79	0.38	1.9	4.23	3.90	2.20	L10.	
2	30	0.4	7.6	3.5	0.60	0.43	1.9	4.60	3.90	3.00	L10.	
3	40	0.4	4.2	2.4	0.55	0.41	1.7	3.55	3.40	1.60	L10.	
4	40	0.5	4.3	2.4	0.54	0.40	1.7	4.03	3.40	1.50	L10.	
5	40	0.5	4.0	2.4	0.55	0.40	1.7	4.93	3.40	1.60		
6	50	0.6	5.6	3.0	0.63	0.19	1.4	3.64	2.73	1.65	L10.	
7	20	0.4	6.7	3.1	0.61	0.29	1.5	3.40	2.10	1.10	L10.	
8	30	0.4	7.4	3.2	0.63	0.36	1.5	3.50	3.30	1.40	L10.	
9	30	0.4	7.2	3.2	0.56	0.34	1.5	3.60	3.20	1.30	L10.	
10	30	0.5	7.3	3.2	0.61	0.34	1.5	3.80	3.60	1.30	L10.	
11	30	0.6	7.7	3.6	0.65	0.34	1.5	3.40	3.30	1.70	L10.	
12	30	0.5	7.9	3.6	0.67	0.30	1.4	3.60	3.40	1.70	L10.	
13	30	0.5	7.8	3.6	0.65	0.37	1.5	3.50	3.40	1.60	L10.	
14	60	0.9	7.2	3.2	0.77	0.36	1.5	4.20	3.50	2.30	L10.	
15	60	0.7	4.8	2.9	0.68	0.31	1.6	4.10	3.46	1.63	L10.	
16	60	0.8	4.4	2.9	0.68	0.32	1.6	4.20	3.43	1.64	L10.	
17	60	0.8	4.5	2.9	0.68	0.34	1.6	4.20	3.43	1.68	L10.	
18												
19												
20												
21												
22	61000.	3.6	6250.	39.0	4.20	18.70	535.0	233.60	247.00	438.00		38
23	61000.	4.4	247.2	58.0	4.80	13.00	390.0	183.00	193.00	450.00		31
24	61000.	4.4	181.0	40.0	3.50	10.60	295.0	165.30	174.00	260.00		28
25	61000.	3.5	234.6	60.0	4.20	10.50	420.0	311.70	330.00	400.00		19
26	61000.	3.3	237.6	60.0	4.10	10.50	415.0	314.30	335.00	407.00		20
27	61000.	2.9	240.5	61.0	4.10	10.50	415.0	309.20	372.00	434.00		22
28	800	5.9	195.5	52.0	4.20	11.00	360.0	229.70	202.00	324.00		28
29	800	6.6	198.9	52.0	4.40	13.00	371.0	231.30	207.00	334.00		31
30	800	5.4	196.7	53.0	4.20	13.00	360.0	26.70		333.00		32
31	6500.	5.0	223.6	51.0	4.10	15.80	346.0	147.70	207.00	340.00		28
32	6500.	2.6	110.3	21.0	1.90	9.80	152.0	113.70	102.00	106.00		11
33	650	3.2	189.1	59.0	4.60	14.90	376.0	164.60	160.00	375.00		52
34	640	8.0	203.5	58.0	4.60	17.00	348.0	260.00	231.00	346.00		46
35												
36												
37	80	1.0	25.2	5.4	0.89	1.10	19.6	13.75	13.00	18.10	L10.	
38	40	0.6	12.0	4.2	0.73	0.54	5.9	6.50	5.80	6.60	L10.	
39	40	0.7	9.8	4.2	0.75	0.49	6.3	6.40	5.80	6.60		
40	40	0.6	9.9	4.2	0.74	0.49	6.3	6.50	5.90	6.70		
41	50	0.7	6.3	2.9	0.59	0.75	5.0	5.62	5.10	4.20	L10.	
42	60	0.8	7.9	3.6	0.64	0.38	5.7	6.26	5.40	5.00	L10.	
43	40	0.9	15.5	4.8	0.79	0.68	12.1	9.39	8.90	10.00	L10.	
44	40	0.8	14.3	4.5	0.75	0.67	8.4	7.50	7.80	7.40	L10.	
45	50	1.2	12.4	4.0	0.72	0.63	5.7	7.60	7.50	5.50	L10.	
46	80	1.3	9.6	4.3	0.84	0.62	7.0	6.00	6.20	7.80	L10.	
47	80	1.5	9.8	4.3	0.84	0.65	7.0	5.90	6.00	7.80	L10.	
48	80	1.4	11.0	4.3	0.83	0.64	6.8	6.10	5.80	7.40	L10.	
49	60	1.3	9.9	3.9	0.76	0.39	4.5	6.10	5.37	4.55	L10.	

TABLE 5
METAL CONCENTRATIONS (mg/L) FOR THE ST.CROIX RIVER
STATIONS AT KELLYLAND, WOODLAND AND MILLTOWN

0	1 STN	2 SDATE	3 STIME	4 SUBID	5 29305 COPPER (MG/L)	6 82302 LEAD (MG/L)	7 48302 CADMIUM (MG/L)	8 80315 MERCURY (UG/L)	9 13305 Al (MG/L)	10 26304 IRON (MG/L)	11 25304 Mn (MG/L)
1	00NB01AR0013	25-JAN-90	1230	145	L.002	L.002	L.001	L.02	0.050	0.16	0.02
2	00NB01AR0013	08-MAR-90	1145	145	L.002	L.002	L.001	L.02	0.057	0.10	0.01
3	00NB01AR0013	10-APR-90	1045	T145	L.002	L.002	L.001	L.02	0.080	0.10	0.01
4	00NB01AR0013	10-APR-90	1047	T145	L.002	L.002	L.001	L.02	0.083	0.09	0.02
5	00NB01AR0013	10-APR-90	1049	T145	L.002	L.002	L.001	L.02	0.088	0.12	0.01
6	00NB01AR0013	22-MAY-90	1201	145	L.002	L.002	L.001	L.02	0.080	0.15	0.02
7	00NB01AR0013	05-JUL-90	950	145	L.002	L.002	L.001	L.02	0.047	0.16	0.04
8	00NB01AR0013	22-AUG-90	1201	T145	L.002	L.002	L.001	L.02	0.037	0.15	0.03
9	00NB01AR0013	22-AUG-90	1210	T145	L.002	L.002	L.001	L.02	0.036	0.15	0.02
10	00NB01AR0013	22-AUG-90	1220	T145	L.002	L.002	L.001	L.02	0.033	0.16	0.03
11	00NB01AR0013	25-SEP-90	818	T145	L.002	L.002	L.001	L.02	0.050	0.11	0.02
12	00NB01AR0013	25-SEP-90	815	T145	L.002	L.002	L.001	L.02	0.050	0.12	0.02
13	00NB01AR0013	25-SEP-90	821	T145	L.002	L.002	L.001	L.02	0.050	0.12	0.02
14	00NB01AR0013	06-NOV-90	1340	145	L.002	L.002	L.001	L.02	0.072	0.22	0.02
15	00NB01AR0013	11-DEC-90	1300	T145	L.002	L.002	L.001	L.02	0.110	0.15	0.02
16	00NB01AR0013	11-DEC-90	1305	T145	L.002	L.002	L.001	L.02	0.097	0.16	0.02
17	00NB01AR0013	11-DEC-90	1310	T145	L.002	L.002	L.001	L.02	0.110	0.16	0.02
18											
19											
20	00NB01AR0014	25-JAN-90	1342	T145	0.004	0.005	0.002	L.02	3.500	0.60	1.10
21	00NB01AR0014	25-JAN-90	1344	T145	0.004	0.005	0.002	L.02	3.500	0.59	1.10
22	00NB01AR0014	25-JAN-90	1340	T145	0.004	0.005	0.002	L.02	3.500	0.59	1.10
23	00NB01AR0014	08-MAR-90	1300	145	0.003	0.003	L.001	L.02	2.500	0.35	2.00
24	00NB01AR0014	10-APR-90	1240	145	0.002	0.003	L.001	L.02	1.900	0.46	1.20
25	00NB01AR0014	22-MAY-90	1300	T145	0.003		L.001	L.02	3.000	0.56	1.50
26	00NB01AR0014	22-MAY-90	1310	T145	0.003		L.001	L.02	3.000	0.58	1.50
27	00NB01AR0014	22-MAY-90	1320	T145	0.003		L.001	L.02	3.000	0.56	1.50
28	00NB01AR0014	05-JUL-90	935	T145	0.003	0.002	0.001	L.02	3.500	0.76	1.30
29	00NB01AR0014	05-JUL-90	945	T145	0.003	0.003	0.001	L.02	3.500	0.75	1.30
30	00NB01AR0014	05-JUL-90	950	T145	0.003	0.003	0.001	L.02	3.500	0.74	1.30
31	00NB01AR0014	22-AUG-90	1325	145	0.004	0.003	0.001	L.02	2.500	0.65	1.40
32	00NB01AR0014	25-SEP-90	1030	145	0.002	L.002	L.001	L.02	0.900	0.43	0.44
33	00NB01AR0014	06-NOV-90	1340	145	0.003	0.005	L.001	L.02	2.700	0.76	1.80
34	00NB01AR0014	11-DEC-90	1345	145	0.004	0.004	0.001	L.02	2.600	0.47	0.98
35											
36											
37	00NB01AR0001	25-JAN-90	1430	145	L.002	L.002	L.001	L.02	0.150	0.21	0.06
38	00NB01AR0001	08-MAR-90	1340	T145	L.002	L.002	L.001	L.02	0.088	0.11	0.00
39	00NB01AR0001	08-MAR-90	1345	T145	L.002	L.002	L.001	L.02	0.083	0.12	0.03
40	00NB01AR0001	08-MAR-90	1350	T145	L.002	L.002	L.001	L.02	0.100	0.14	0.04
41	00NB01AR0001	10-APR-90	1400	145	L.002	0.002	L.001	L.02	0.110	0.18	0.02
42	00NB01AR0001	22-MAY-90	1420	145	L.002	L.002	L.001	L.02	0.110	0.20	0.03
43	00NB01AR0001	05-JUL-90	1300	145	L.002	L.002	L.001	L.02	0.130	0.22	0.03
44	00NB01AR0001	22-AUG-90	1400	145	L.002	L.002	L.001	L.02	0.072	0.19	0.05
45	00NB01AR0001	25-SEP-90	1201	145	L.002	L.002	L.001	L.02	0.086	0.25	0.04
46	00NB01AR0001	06-NOV-90	1545	T145	L.002	L.002	L.001	L.02	0.130	0.33	0.05
47	00NB01AR0001	06-NOV-90	1550	T145	L.002	L.002	L.001	L.02	0.120	0.33	0.06
48	00NB01AR0001	06-NOV-90	1540	T145	L.002	L.002	L.001	L.02	0.130	0.32	0.06
49	00NB01AR0001	11-DEC-90	1201	145	L.002	L.002	L.001	L.02	0.130	0.19	0.03

TABLE 6

NUTRIENT CONCENTRATIONS (mg/L) FOR ST. CROIX RIVER

STATIONS AT KELLYLAND, WOODLAND AND MILLTOWN

0	1 STN	2 SDATE	3 STIME	4 SUBID	5 06107 DOC (MG/L)	6 07110 NO3 NO2 (MG/L)	7 07315 NO3 (MG/L)	8 07601 TN (MG/L)	9 15413 T PHOS (MG/L)
1	00NB01AR0013	25-JAN-90	1230	145	6.9	0.10		0.25	0.007
2	00NB01AR0013	08-MAR-90	1145	145	6.2	0.07		0.14	0.005
3	00NB01AR0013	10-APR-90	1045	T145	5.8	0.03		0.22	0.007
4	00NB01AR0013	10-APR-90	1047	T145	5.6	0.01		0.21	0.007
5	00NB01AR0013	10-APR-90	1049	T145	5.6	0.01		0.21	0.015
6	00NB01AR0013	22-MAY-90	1201	145	7.4	0.05		0.15	0.005
7	00NB01AR0013	05-JUL-90	930	-145	5.8	L.01		0.17	0.011
8	00NB01AR0013	22-AUG-90	1201	T145	6.2	L.01		0.22	0.009
9	00NB01AR0013	22-AUG-90	1210	T145	5.8	L.01		0.23	0.009
10	00NB01AR0013	22-AUG-90	1220	T145	5.5	L.01		0.23	0.008
11	00NB01AR0013	25-SEP-90	818	T145	6.8	0.05		0.12	0.009
12	00NB01AR0013	25-SEP-90	815	T145	6.6	0.05		0.12	0.008
13	00NB01AR0013	25-SEP-90	821	T145	6.7	L.01		0.13	0.008
14	00NB01AR0013	06-NOV-90	1340	145	9.5	0.06	0.08	0.26	0.011
15	00NB01AR0013	11-DEC-90	1300	T145	8.2	0.04	0.06	0.22	0.009
16	00NB01AR0013	11-DEC-90	1305	T145	8.3	0.04	0.06	0.22	0.009
17	00NB01AR0013	11-DEC-90	1310	T145	8.2	0.05	0.07	0.22	0.012
18									
19									
20	00NB01AR0014	25-JAN-90	1342	T145					
21	00NB01AR0014	25-JAN-90	1344	T145					
22	00NB01AR0014	25-JAN-90	1340	T145	71.0	2.15		2.90	
23	00NB01AR0014	08-MAR-90	1300	145	38.0	0.08		2.00	
24	00NB01AR0014	10-APR-90	1240	145	42.0	1.60		2.60	0.490
25	00NB01AR0014	22-MAY-90	1300	T145	67.0	1.80		2.40	0.300
26	00NB01AR0014	22-MAY-90	1310	T145	70.0	2.00		2.20	0.300
27	00NB01AR0014	22-MAY-90	1320	T145	70.0	1.80		2.40	0.200
28	00NB01AR0014	05-JUL-90	935	T145	49.5	3.30		4.30	0.700
29	00NB01AR0014	05-JUL-90	945	T145	50.4	3.50		4.20	0.600
30	00NB01AR0014	05-JUL-90	950	T145	49.5	3.30		4.10	0.700
31	00NB01AR0014	22-AUG-90	1325	145	44.3	3.50		4.00	
32	00NB01AR0014	25-SEP-90	1030	145	25.1	0.86		0.97	0.300
33	00NB01AR0014	06-NOV-90	1340	145	58.0	5.30		7.20	0.400
34	00NB01AR0014	11-DEC-90	1345	145	44.6	3.20	0.52	0.51	0.400
35									
36									
37	00NB01AR0001	25-JAN-90	1430	145	9.0	0.09		0.31	0.026
38	00NB01AR0001	08-MAR-90	1340	T145	6.3	0.08		0.21	0.011
39	00NB01AR0001	08-MAR-90	1345	T145	6.1	0.08		0.21	0.013
40	00NB01AR0001	08-MAR-90	1350	T145	6.4	0.09		0.20	0.011
41	00NB01AR0001	10-APR-90	1400	145	6.1	0.04		0.21	0.014
42	00NB01AR0001	22-MAY-90	1420	145	7.9	0.80		0.23	0.011
43	00NB01AR0001	05-JUL-90	1300	145	6.9	0.10		0.26	0.023
44	00NB01AR0001	22-AUG-90	1400	145	6.0	0.05		0.26	0.023
45	00NB01AR0001	25-SEP-90	1201	145	8.2	0.05		0.19	0.019
46	00NB01AR0001	06-NOV-90	1545	T145	10.6	0.06	0.08	0.28	0.023
47	00NB01AR0001	06-NOV-90	1550	T145	10.6	0.14	0.11	0.35	0.026
48	00NB01AR0001	06-NOV-90	1540	T145	10.6	0.03	L.05	0.30	0.027
49	00NB01AR0001	11-DEC-90	1201	145	8.2	0.08	0.12	0.26	0.016

TABLE 7

MAJOR ION EQUIVALENT CONCENTRATIONS (meq/L)FOR THE ST. CROIX RIVER STATIONS AT KELLYLAND, WOODLAND AND MILLTOWN

0	1 STN	2 SDATE	3 CA meq/L	4 MG meq/L	5 K meq/L	6 NA meq/l	7 SO4 meq/l	8 CL meq/l	9 HCO3 meq/L
1	00NB01AR0013	25-JAN-90	0.20958	0.064985	0.009717	0.08265	0.081198	0.062062	0.167832
2	00NB01AR0013	08-MAR-90	0.17465	0.049356	0.010995	0.08265	0.081198	0.084630	0.151848
3	00NB01AR0013	10-APR-90	0.11976	0.045243	0.010484	0.07395	0.070788	0.045136	0.083916
4	00NB01AR0013	10-APR-90	0.11976	0.044420	0.010228	0.07395	0.070788	0.042315	0.085914
5	00NB01AR0013	10-APR-90	0.11976	0.045243	0.010228	0.07395	0.070788	0.045136	0.079920
6	00NB01AR0013	22-MAY-90	0.14970	0.051824	0.004858	0.06090	0.056839	0.046547	0.111888
7	00NB01AR0013	05-JUL-90	0.15469	0.050179	0.007415	0.06525	0.043722	0.031031	0.133866
8	00NB01AR0013	22-AUG-90	0.15968	0.051824	0.009205	0.06525	0.068706	0.039494	0.147852
9	00NB01AR0013	22-AUG-90	0.15968	0.046066	0.008694	0.06525	0.066624	0.036673	0.143856
10	00NB01AR0013	22-AUG-90	0.15968	0.050179	0.008694	0.06525	0.074952	0.036673	0.145854
11	00NB01AR0013	25-SEP-90	0.17964	0.053469	0.008694	0.06525	0.068706	0.047957	0.153846
12	00NB01AR0013	25-SEP-90	0.17964	0.055114	0.007671	0.06090	0.070788	0.047957	0.157842
13	00NB01AR0013	25-SEP-90	0.17964	0.053469	0.009461	0.06525	0.070788	0.045136	0.155844
14	00NB01AR0013	06-NOV-90	0.15968	0.063340	0.009205	0.06525	0.072870	0.064883	0.143856
15	00NB01AR0013	11-DEC-90	0.14471	0.055937	0.007927	0.06960	0.072037	0.045982	0.095904
16	00NB01AR0013	11-DEC-90	0.14471	0.055937	0.008182	0.06960	0.071413	0.046264	0.087912
17	00NB01AR0013	11-DEC-90	0.14471	0.055937	0.008694	0.06960	0.071413	0.047393	0.089910
18									
19									
20	00NB01AR0014	25-JAN-90							
21	00NB01AR0014	25-JAN-90							
22	00NB01AR0014	25-JAN-90	1.94610	0.345492	0.478159	23.27250	5.142540	12.335980	4.995000
23	00NB01AR0014	08-MAR-90	2.89420	0.394848	0.332410	16.96500	4.018260	12.694500	4.939056
24	00NB01AR0014	10-APR-90	1.99600	0.287910	0.271042	12.83250	3.622680	7.334600	3.616380
25	00NB01AR0014	22-MAY-90	2.99400	0.345492	0.268485	18.27000	6.870600	11.284000	4.687308
26	00NB01AR0014	22-MAY-90	2.99400	0.337266	0.268485	18.05250	6.974700	11.481470	4.747248
27	00NB01AR0014	22-MAY-90	3.04390	0.337266	0.268485	18.05250	7.745040	12.243140	4.805190
28	00NB01AR0014	05-JUL-90	2.59480	0.345492	0.281270	15.66000	4.205640	9.140040	3.906090
29	00NB01AR0014	05-JUL-90	2.59480	0.361944	0.332410	16.13850	4.309740	9.422140	3.974022
30	00NB01AR0014	05-JUL-90	2.64470	0.345492	0.332410	15.66000		9.393930	3.930066
31	00NB01AR0014	22-AUG-90	2.54490	0.337266	0.404006	15.05100	4.309740	9.591400	4.467528
32	00NB01AR0014	25-SEP-90	1.04790	0.156294	0.250586	6.61200	2.123640	2.990260	2.203794
33	00NB01AR0014	06-NOV-90	2.94410	0.378396	0.380993	16.35600	3.331200	10.578750	3.778218
34	00NB01AR0014	11-DEC-90	2.89420	0.378396	0.434690	15.13800	4.809420	9.760660	4.065930
35									
36									
37	00NB01AR0001	25-JAN-90	0.26946	0.073211	0.028127	0.85260	0.270660	0.510601	0.503496
38	00NB01AR0001	08-MAR-90	0.20958	0.060050	0.013808	0.25665	0.120756	0.186186	0.239760
39	00NB01AR0001	08-MAR-90	0.20958	0.061695	0.012529	0.27405	0.120756	0.186186	0.195804
40	00NB01AR0001	08-MAR-90	0.20958	0.060872	0.012529	0.27405	0.122838	0.189007	0.197802
41	00NB01AR0001	10-APR-90	0.14471	0.048533	0.019178	0.21750	0.106182	0.118482	0.125874
42	00NB01AR0001	22-MAY-90	0.17964	0.052646	0.009717	0.24795	0.112428	0.141050	0.157842
43	00NB01AR0001	05-JUL-90	0.23952	0.064985	0.017388	0.52635	0.185298	0.282100	0.309690
44	00NB01AR0001	22-AUG-90	0.22455	0.061695	0.017132	0.36540	0.162396	0.208754	0.285714
45	00NB01AR0001	25-SEP-90	0.19960	0.059227	0.016109	0.24795	0.156150	0.155155	0.247752
46	00NB01AR0001	06-NOV-90	0.21457	0.069098	0.015853	0.30450	0.129084	0.220038	0.191808
47	00NB01AR0001	06-NOV-90	0.21457	0.069098	0.016621	0.30450	0.124920	0.220038	0.195804
48	00NB01AR0001	06-NOV-90	0.21457	0.068276	0.016365	0.29580	0.120756	0.208754	0.219780
49	00NB01AR0001	11-DEC-90	0.19461	0.062518	0.009972	0.19575	0.111803	0.128356	0.197802

TABLE 8
RESULTS OF TRIPLICATE SAMPLING IN THE ST. CROIX RIVER BASIN
MOB GRAB SAMPLES - JANUARY TO DECEMBER 1990

0	1 STN	2 DATE	3 LAB pH	4 DISS. CL	5 DISS.ORG. CARBON	6 TOTAL PHOS.	7 EXT. AL
1	00NB01AR0013	10-APR-90	6.50	1.60	5.80	0.007	0.080
2	00NB01AR0013	10-APR-90	6.60	1.50	5.60	0.007	0.083
3	00NB01AR0013	10-APR-90	6.50	1.60	5.60	0.015	0.088
4	MEAN		6.53	1.57	5.67	0.010	0.084
5	S.D.		0.06	0.06	0.12	0.005	0.004
6	C.V.%		0.88	3.69	2.04	47.781	4.830
7							
8	00NB01AR0013	22-AUG-90	6.70	1.40	6.20	0.009	0.037
9	00NB01AR0013	22-AUG-90	6.70	1.30	5.80	0.009	0.036
10	00NB01AR0013	22-AUG-90	6.70	1.30	5.50	0.008	0.033
11	MEAN		6.70	1.33	5.83	0.009	0.035
12	S.D.		0.00	0.06	0.35	0.001	0.002
13	C.V.%		0.00	4.33	6.02	6.662	5.892
14							
15	00NB01AR0013	25-SEP-90	6.80	1.70	6.80	0.009	0.050
16	00NB01AR0013	25-SEP-90	6.80	1.70	6.60	0.008	0.050
17	00NB01AR0013	25-SEP-90	6.80	1.60	6.70	0.008	0.050
18	MEAN		6.80	1.67	6.70	0.008	0.050
19	S.D.		0.00	0.06	0.10	0.001	0.000
20	C.V.%		0.00	3.46	1.49	6.928	0.000
21							
22	00NB01AR0013	11-DEC-90	6.40	1.63	8.20	0.009	0.110
23	00NB01AR0013	11-DEC-90	6.30	1.64	8.30	0.009	0.097
24	00NB01AR0013	11-DEC-90	6.40	1.68	8.20	0.012	0.110
25	MEAN		6.37	1.65	8.23	0.010	0.106
26	S.D.		0.06	0.03	0.06	0.002	0.008
27	C.V.%		0.91	1.60	0.70	17.321	7.103
28							
29	00NB01AR0014	22-MAY-90	7.20	400.00	67.00	0.300	
30	00NB01AR0014	22-MAY-90	7.20	407.00	70.00	0.300	
31	00NB01AR0014	22-MAY-90	7.30	434.00	70.00	0.200	
32	MEAN		7.23	413.67	69.00	0.267	
33	S.D.		0.06	17.95	1.73	0.058	
34	C.V.%		0.80	4.34	2.51	21.651	
35							
36	00NB01AR0014	05-JUL-90	7.30	324.00	49.50	0.700	
37	00NB01AR0014	05-JUL-90	7.30	334.00	50.40	0.600	
38	00NB01AR0014	05-JUL-90	7.30	333.00	49.50	0.700	
39	MEAN		7.30	330.33	49.80	0.667	
40	S.D.		0.00	5.51	0.52	0.058	
41	C.V.%		0.00	1.67	1.04	8.660	
42							
43	00NB01AR0001	08-MAR-90	6.90	6.60	6.30	0.011	0.088
44	00NB01AR0001	08-MAR-90	6.90	6.60	6.10	0.013	0.083
45	00NB01AR0001	08-MAR-90	6.80	6.70	6.40	0.011	0.100
46	MEAN		6.87	6.63	6.27	0.012	0.090
47	S.D.		0.06	0.06	0.15	0.001	0.009
48	C.V.%		0.84	0.87	2.44	9.897	9.672
49							
50	00NB01AR0001	06-NOV-90	6.50	7.80	10.60	0.023	0.130
51	00NB01AR0001	06-NOV-90	6.50	7.80	10.60	0.026	0.120
52	00NB01AR0001	06-NOV-90	6.70	7.40	10.60	0.027	0.130

TABLE 8

RESULTS OF TRIPLICATE SAMPLING IN THE ST. CROIX RIVER BASIN

WQB GRAB SAMPLES - JANUARY TO DECEMBER 1990

0	1 STN	2 DATE	3 LAB pH	4 DISS. CL	5 DISS.ORG. CARBON	6 TOTAL PHOS.	7 EXT. AL
53	MEAN		6.57	7.67	10.60	0.025	0.127
54	S.D.		0.12	0.23	0.00	0.002	0.006
55	C.V.%		1.76	3.01	0.00	8.217	4.558

TABLE 9
QC DATA FOR TOTAL PHOSPHORUS AND METALS
FROM DISTILLED BLANKS

0	1 STN	2 SAMPLE	3 SDATE	4 STIME	5 SUBID	6 15413 T PHOS (MG/L)	7 29305 COPPER (MG/L)	8 82302 LEAD (MG/L)	9 48302 CADMIUM (MG/L)	10 80315 MERCURY (UG/L)	11 13305 Al (MG/L)
1	00NB01AR9901	903522	25-JAN-90	1201	145	L.001	L.002	L.002	L.001	L.02	L.010
2	00NB01AR9901	903637	08-MAR-90	1201	145	L.001	L.002	L.002	L.001		L.010
3	00NB01AR9901	186	10-APR-90	1400	145	L.001	L.002	L.002	L.001	L.02	L.010
4	00NB01AR9901	545	05-JUN-90	1400	145	L.001	L.002	L.002	L.001	L.02	L.01
5	00NB01AR9901	1411	05-JUL-90	1201	145	L.001	L.002	L.002	L.001	L.02	L.010
6	00NB01AR9901	2220	22-AUG-90	1201	145	L.001	L.002	L.002	L.001	L.02	L.010
7	00NB01AR9901	2539	25-SEP-90	1201	145	L.001	L.002	L.002	L.001	L.02	L.010
8	00NB01AR9901	3385	06-NOV-90	1201	145	L.001	L.002	L.002	L.001	L.02	L.010

0	12 25304 Mn (MG/L)
1	L.010
2	L.010
3	L.010
4	L.010
5	L.01
6	L.010
7	L.010
8	L.010

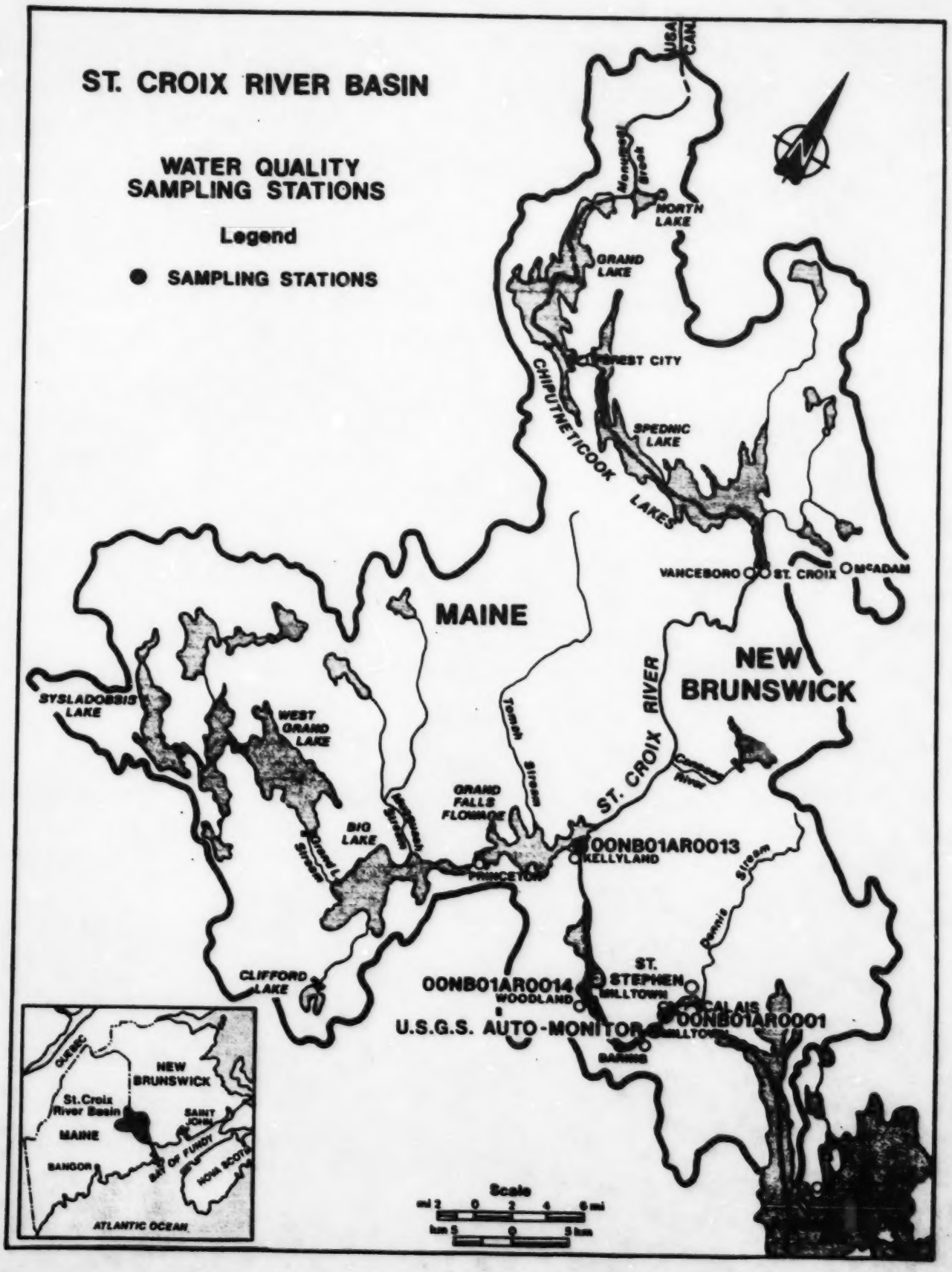

ST. CROIX RIVER BASIN
WATER QUALITY
SAMPLING STATIONS
Legend
SAMPLING STATIONS
NORTH LAKE
GRAND LAKE
FOREST CITY
CHIPUTNETICOOK LAKES
SPEDNIC LAKE
VANCEBORO
ST. CROIX
McADAM
MAINE
NEW BRUNSWICK
ST. CROIX RIVER
SYSLADOBSIS LAKE
WEST GRAND LAKE
BIG LAKE
GRAND FALLS FLOWAGE
PRINCETON
01NB01AR0013
KELLYLAND
CLIFFORD LAKE
01NB01AR0014
WOODLAND
ST. STEPHEN
CALAIS
01NB01AR0001
U.S.G.S. AUTO-MONITOR
BARING
Scale
QUEBEC
NEW BRUNSWICK
St. Croix River Basin
SAINT JOHN
MAINE
BANGOR
BAY OF FUNDY
NOVA SCOTIA
ATLANTIC OCEAN

Figure 1

FIGURE 2
DISSOLVED OXYGEN (MG/L) AT THE ST. CROIX RIVER
SAMPLING STATIONS - WQB GRAB SAMPLES
JANUARY TO DECEMBER 1990

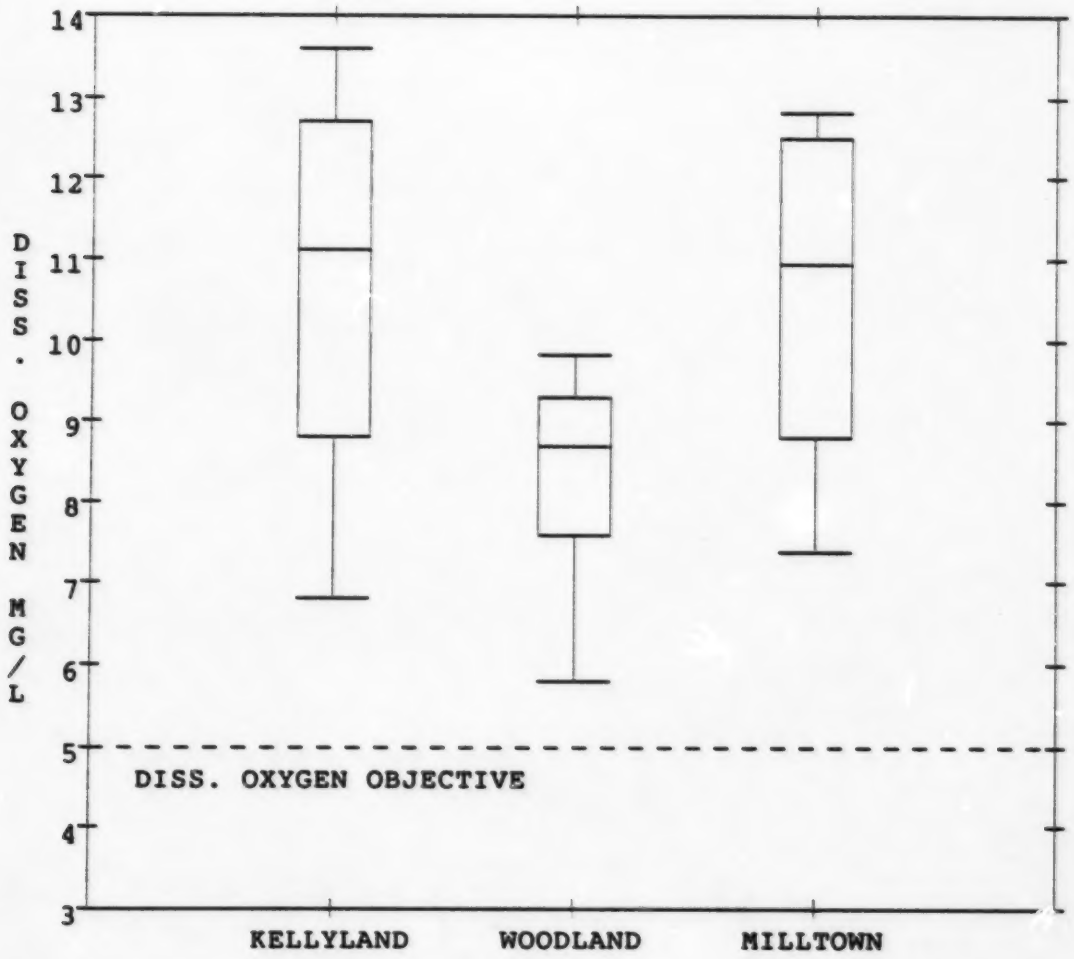


FIGURE 3
DISSOLVED OXYGEN (% SATURATION) AT THE ST. CROIX RIVER
SAMPLING STATIONS - WQB GRAB SAMPLES
JANUARY TO DECEMBER 1990

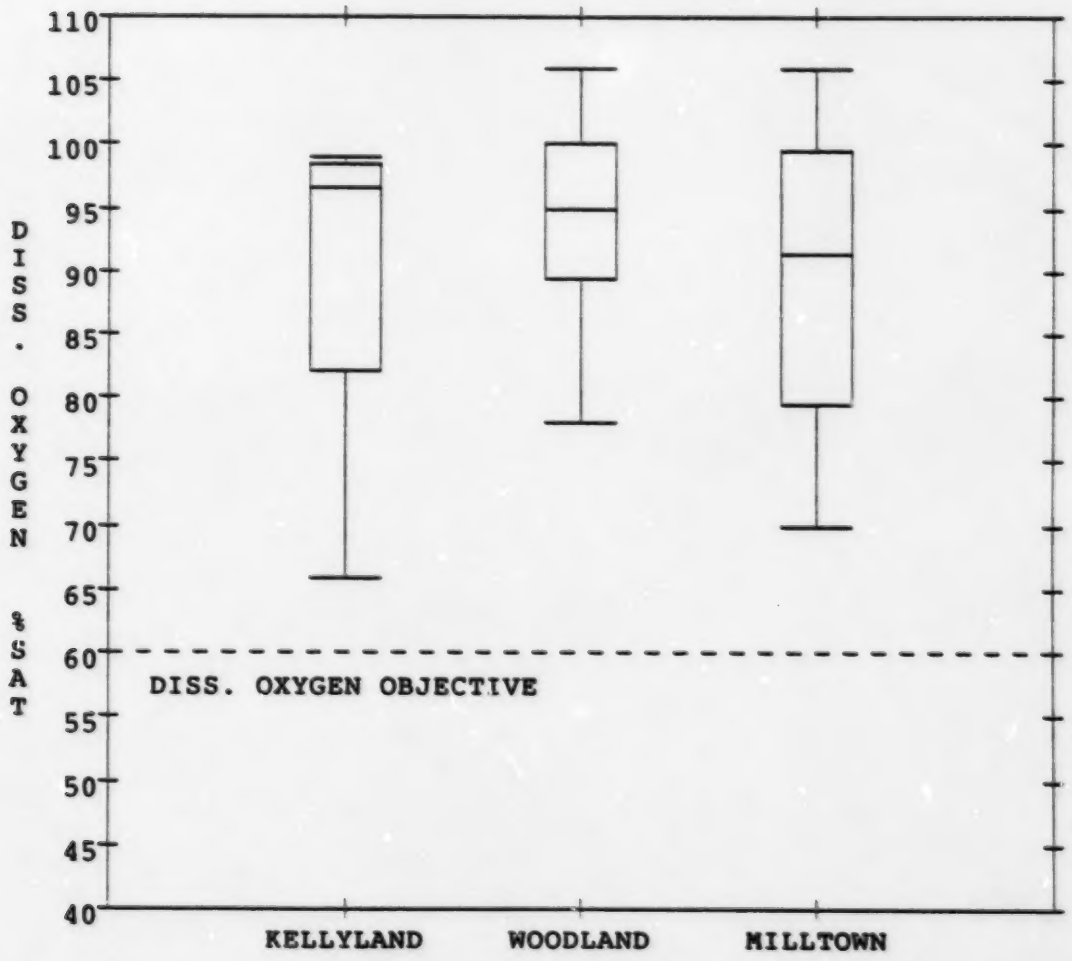


FIGURE 4
pH AT ST. CROIX RIVER SAMPLING STATIONS
WQB GRAB SAMPLES - JANUARY TO DECEMBER 1990

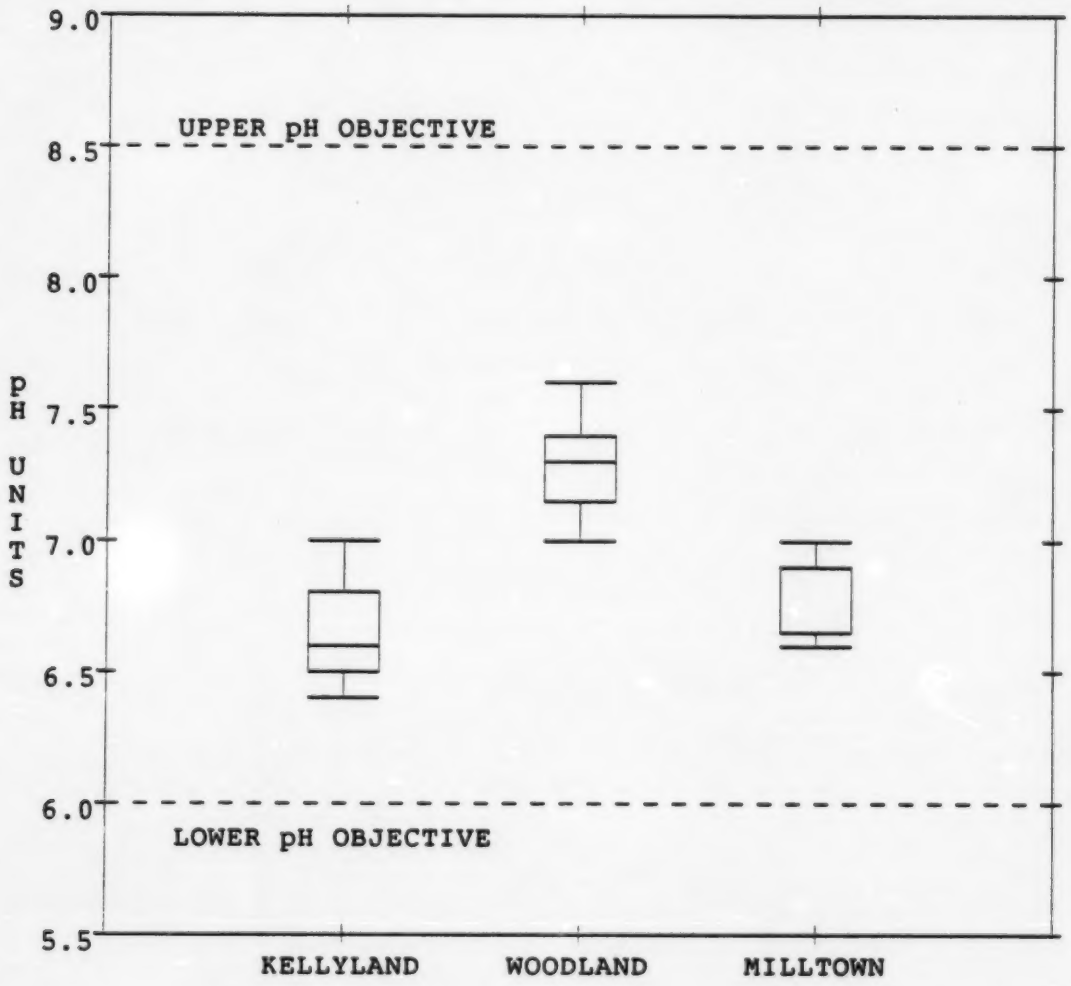


FIGURE 5
ST. CROIX RIVER AT MILLTOWN AWQM DATA
MEAN DISSOLVED OXYGEN (mg/L)
FOR JULY, AUGUST AND SEPTEMBER 1990

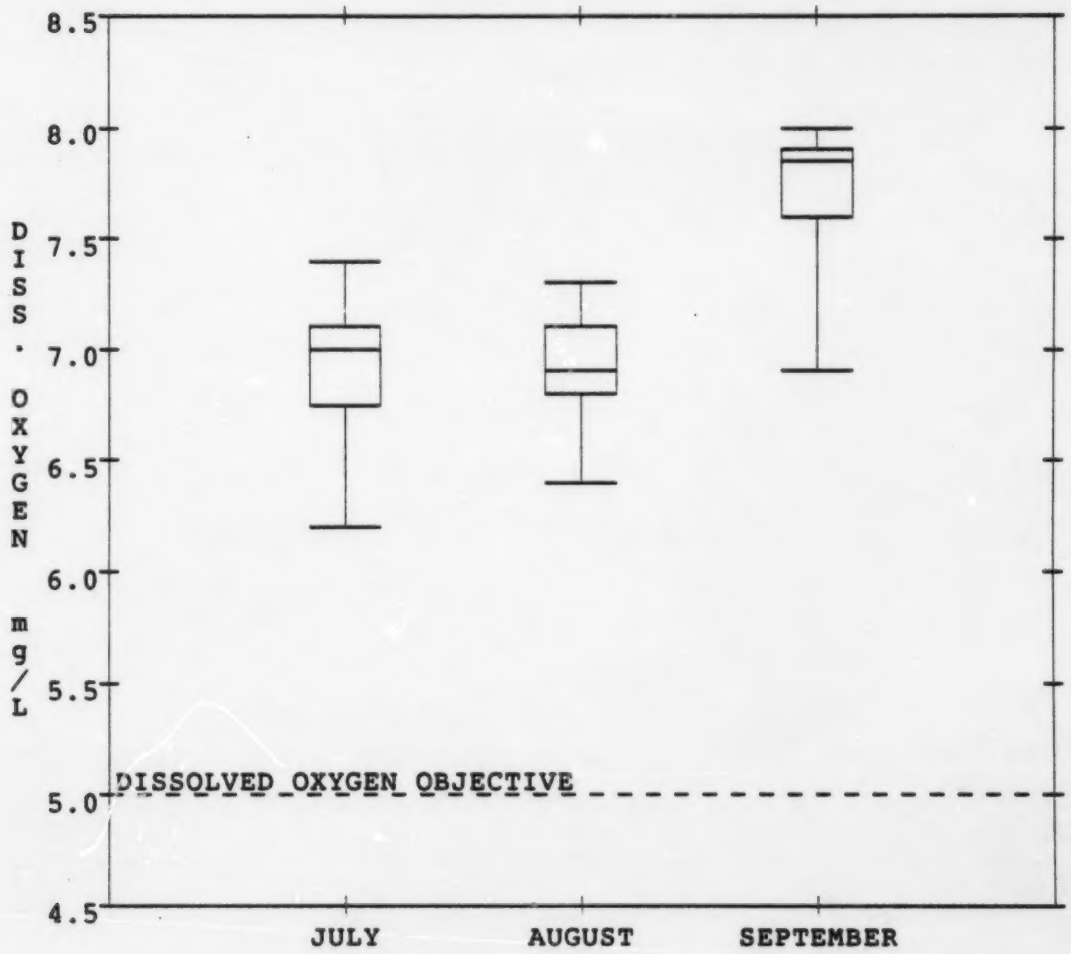


FIGURE 6
ST. CROIX RIVER AT MILLTOWN AWQM PROVISIONAL DATA
MEAN DISSOLVED OXYGEN (% SATURATION) FOR
JULY, AUGUST, AND SEPTEMBER 1990

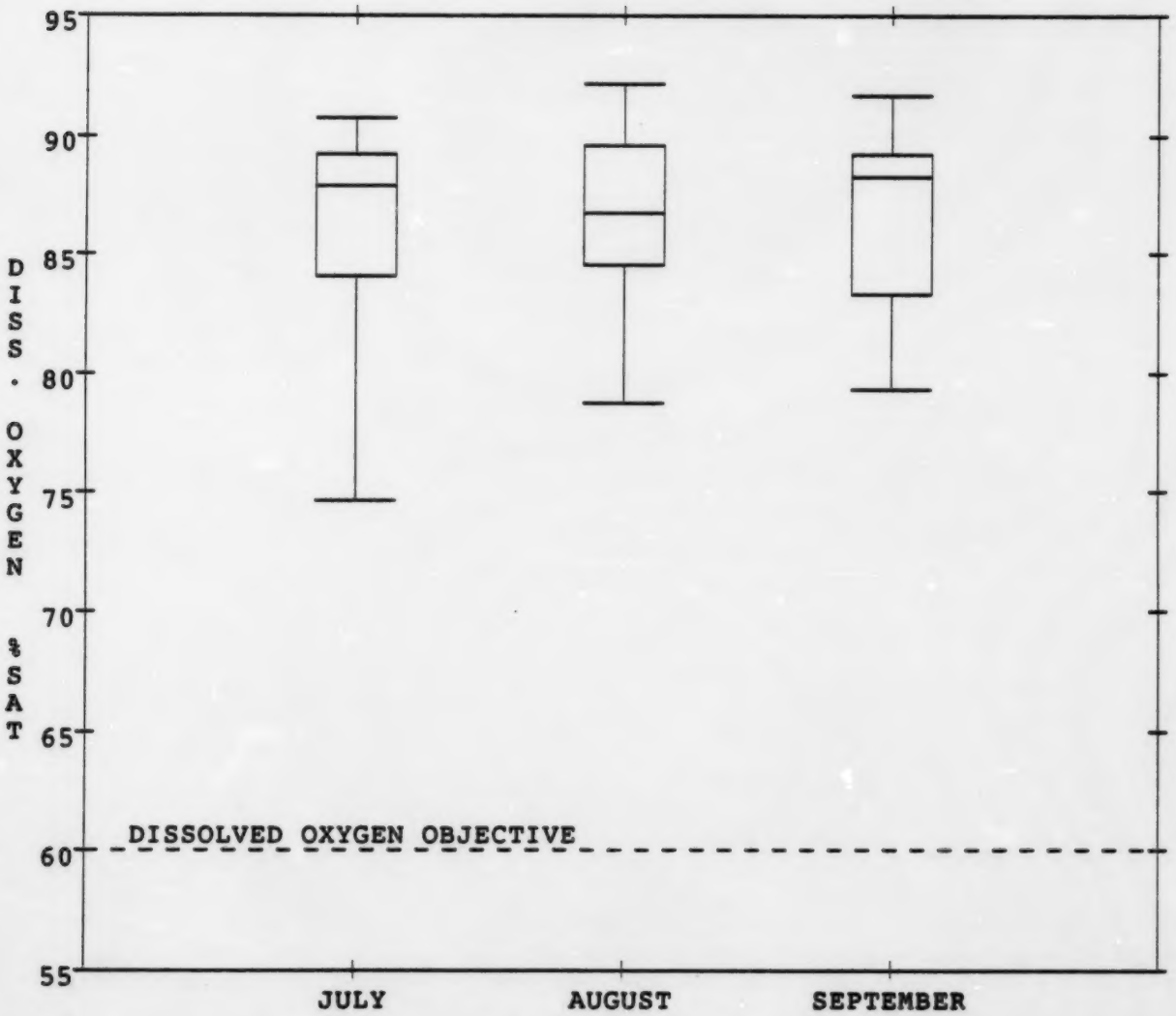


FIGURE 7
ST. CROIX RIVER AT MILLTOWN AWQM PROVISIONAL DATA
MEAN DISSOLVED OXYGEN (mg/L) AND MEAN DISCHARGE (M**3/S)
JULY 1 TO SEPTEMBER 30, 1990

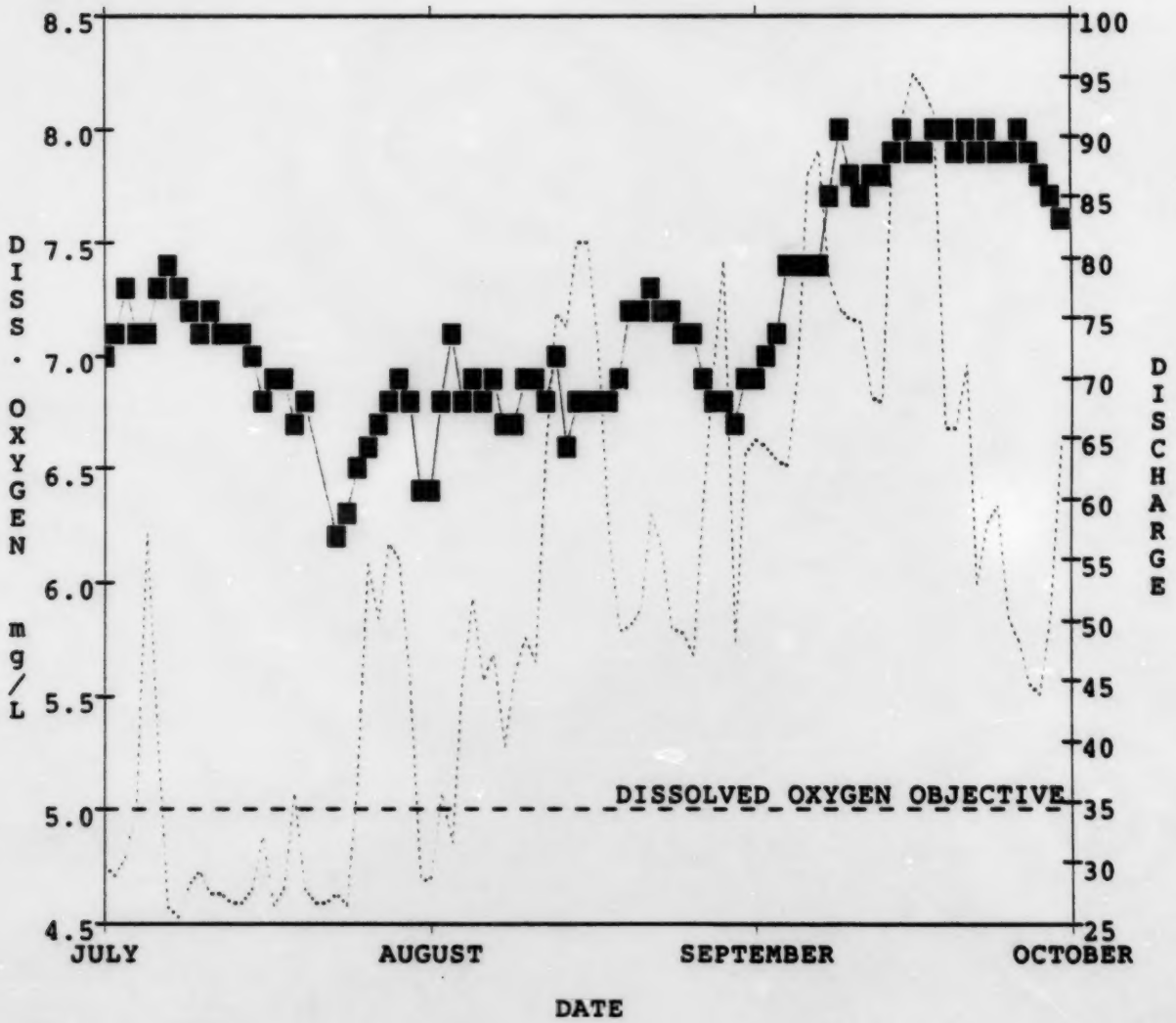


FIGURE 8
ST. CROIX AT MILLTOWN AWQM PROVISIONAL DATA
MEAN DISSOLVED OXYGEN (% SATURATION) AND MEAN DISCHARGE (M**3/S)
JULY 1 TO SEPTEMBER 30, 1990

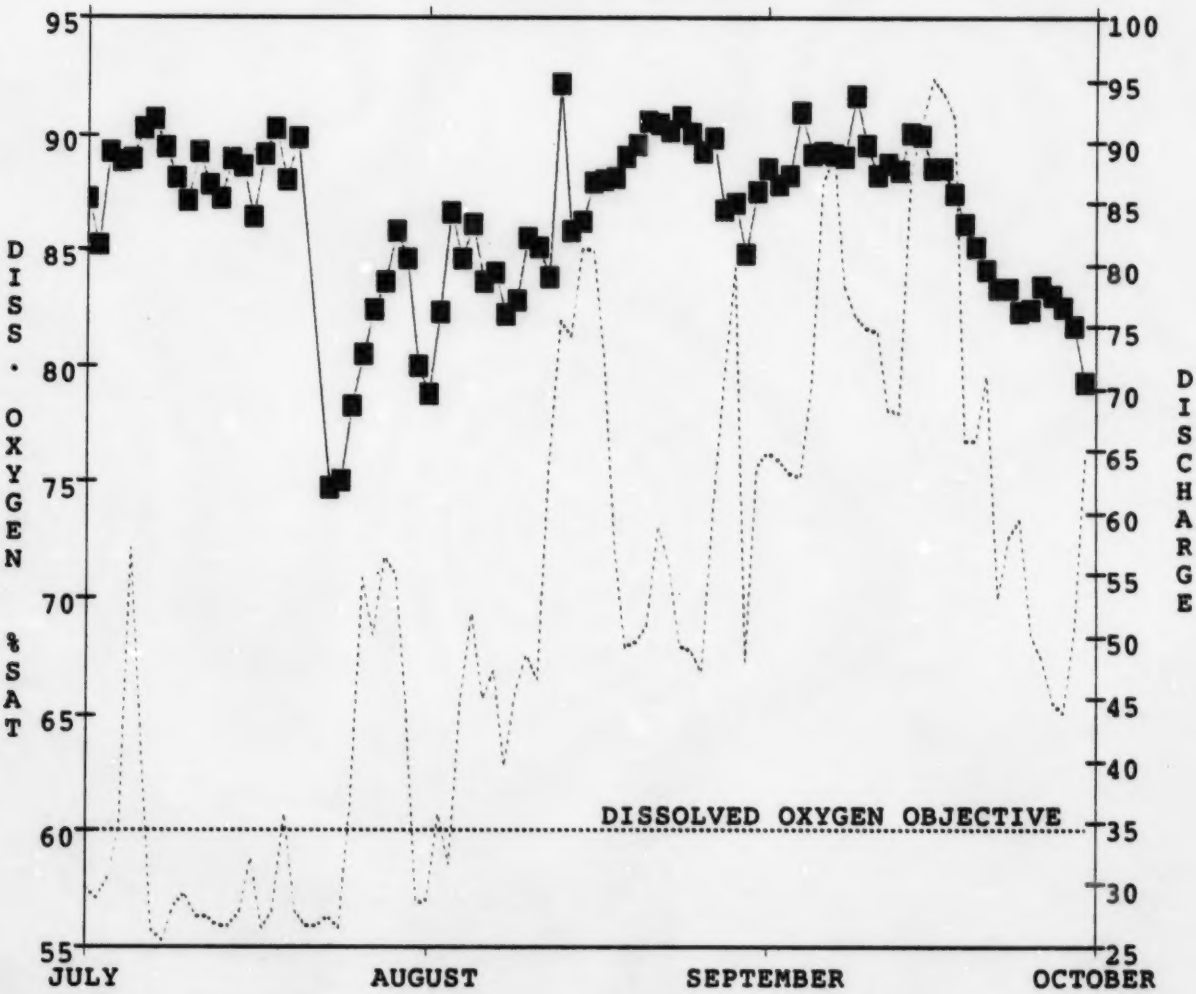
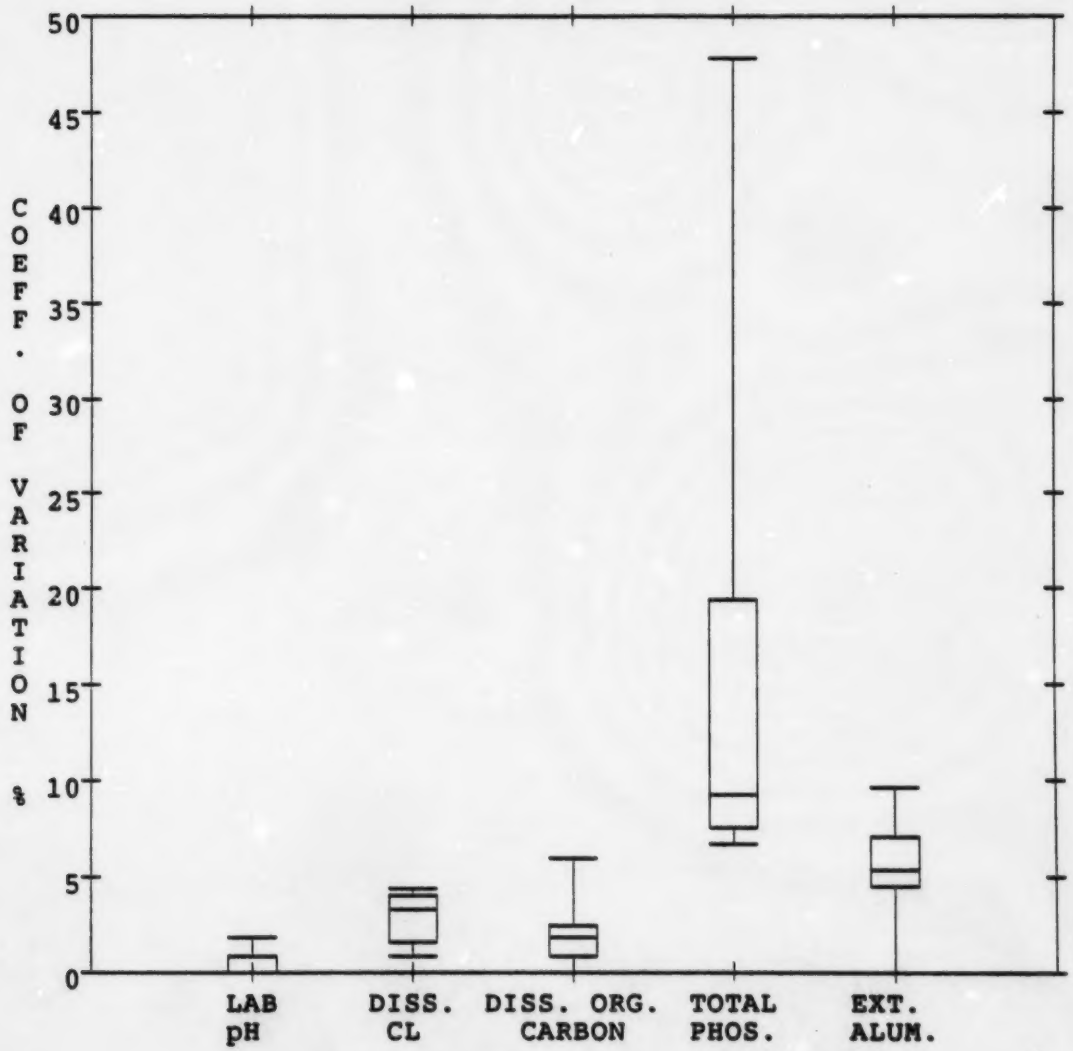


FIGURE 9
COEFFICIENTS OF VARIATION FOR SELECTED PARAMETERS OF
SEQUENTIAL TRIPLICATE SAMPLES - WQB GRAB SAMPLES
JANUARY TO DECEMBER 1990



APPENDIX I

SUMMARY OF DAILY AVQM VALUES FOR THE

ST. CROIX RIVER AT MILLTOWN

SUMMARY OF DAILY AWQM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-JAN-90 to 31-JAN-90

DAY	TEMPERATURE C				pH units				SPECIFIC CONDUCTANCE us/cm			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-JAN-90	0.4	0.4	0.4	24	7.4	7.5	7.6	24	160.1	168.4	187.5	24
2-JAN-90	0.4	0.4	0.4	24	7.3	7.4	7.4	24	156.2	160.0	167.9	24
3-JAN-90	0.4	0.4	0.4	24	7.3	7.4	7.4	24	152.3	159.6	171.9	24
4-JAN-90	0.4	0.4	0.4	24	7.2	7.3	7.4	24	156.2	157.8	160.1	24
5-JAN-90	0.4	0.4	0.4	24	6.9	7.1	7.4	24	58.6	93.4	160.1	24
6-JAN-90	0.4	0.4	0.4	24	6.8	6.9	6.9	24	58.6	60.2	62.5	24
7-JAN-90	0.4	0.4	0.4	24	6.8	6.8	6.9	24	58.6	58.9	62.5	24
8-JAN-90	0.4	0.4	0.4	24	6.8	6.9	6.9	24	58.6	61.3	62.5	24
9-JAN-90	0.4	0.4	0.4	24	6.9	6.9	6.9	24	62.5	63.3	66.4	24
10-JAN-90	0.4	0.4	0.4	24	6.7	6.9	6.9	24	58.6	59.6	62.5	24
11-JAN-90	0.4	0.4	0.4	24	6.8	6.8	6.9	24	58.6	61.2	62.5	24
12-JAN-90	0.4	0.4	0.8	24	6.9	6.9	6.9	24	54.7	56.3	62.5	24
13-JAN-90	0.4	0.4	0.4	24	6.8	6.9	7.2	24	54.7	72.6	117.2	24
14-JAN-90	0.4	0.4	0.4	24	7.1	7.1	7.2	24	121.1	133.6	148.4	24
15-JAN-90	0.4	0.4	0.4	24	7.2	7.2	7.3	24	148.4	151.2	156.2	24
16-JAN-90	0.4	0.4	0.4	24	7.2	7.4	7.5	24	148.4	161.1	179.7	24
17-JAN-90	0.4	0.4	0.4	24	7.2	7.3	7.5	24	128.9	141.6	175.8	24
18-JAN-90	0.4	0.6	0.8	24	7.2	7.3	7.3	24	132.8	141.9	148.4	24
19-JAN-90	0.4	0.7	0.8	24	7.2	7.3	7.3	24	148.4	152.0	156.2	24
20-JAN-90	0.4	0.4	0.4	24	7.2	7.2	7.3	24	148.4	154.9	164.0	24
21-JAN-90	0.4	0.4	0.4	9	7.2	7.2	7.3	9	152.3	157.1	164.0	9
22-JAN-90	0.4	0.4	0.4	24	7.2	7.2	7.2	24	148.4	150.0	152.3	24
23-JAN-90	0.4	0.4	0.4	24	7.2	7.2	7.2	24	144.5	150.5	167.9	24
24-JAN-90	0.4	0.4	0.4	24	7.2	7.3	7.3	24	144.5	147.6	152.3	24
25-JAN-90	0.4	0.4	0.8	24	7.3	7.3	7.4	24	152.3	153.5	156.2	24
26-JAN-90	0.8	0.9	1.2	24	7.1	7.2	7.3	24	89.8	128.7	152.3	24
27-JAN-90	0.8	0.8	1.2	24	6.7	6.9	7.1	24	78.1	83.5	89.8	24
28-JAN-90	0.4	0.7	1.2	24	6.7	6.7	6.8	24	74.2	76.8	78.1	24
29-JAN-90	0.8	0.8	1.2	24	6.7	6.8	6.9	24	78.1	86.6	89.8	24
30-JAN-90	0.4	0.5	0.8	24	6.8	6.9	7.0	24	89.8	102.8	113.3	24
31-JAN-90	0.4	0.4	0.4	24	6.8	6.8	6.9	24	93.7	97.5	105.5	24
GRAND MONTHLY MEAN	0.4	0.5	0.6		7.0	7.1	7.2		108.7	116.2	127.6	

\# A day with less than 24 values.

**** No data values for that day.

SUMMARY OF DAILY AMGM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-JAN-90 to 31-JAN-90

05-Sep-90 ENVIRONMENT CANADA WATER QUALITY BRANCH - MONCTON

DAY	DISSOLVED OXYGEN mg/l				DISSOLVED OXYGEN % saturation				FLOW cf/s			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-JAN-90	11.2	11.3	11.5	24	80.6	81.3	82.3	24	*******	*******	*******	**
2-JAN-90	10.9	11.3	11.6	24	77.9	80.7	82.9	24	*******	*******	*******	**
3-JAN-90	11.1	11.4	11.6	24	79.6	81.7	83.0	24	*******	*******	*******	**
4-JAN-90	11.5	11.6	11.7	24	82.4	82.8	83.6	24	*******	*******	*******	**
5-JAN-90	11.4	11.6	11.8	24	81.4	83.0	84.8	24	*******	*******	*******	**
6-JAN-90	11.8	12.0	12.2	24	84.8	86.4	87.6	24	*******	*******	*******	**
7-JAN-90	12.1	12.2	12.3	24	86.5	87.3	88.2	24	*******	*******	*******	**
8-JAN-90	11.8	12.0	12.1	24	84.9	85.8	87.1	24	*******	*******	*******	**
9-JAN-90	11.7	11.8	12.0	24	83.8	84.9	86.0	24	*******	*******	*******	**
10-JAN-90	11.5	11.7	11.8	24	82.7	83.6	84.4	24	*******	*******	*******	**
11-JAN-90	11.4	11.6	12.1	24	81.7	83.4	86.7	24	*******	*******	*******	**
12-JAN-90	11.4	11.7	12.2	24	81.7	83.9	87.3	24	*******	*******	*******	**
13-JAN-90	11.0	11.3	11.9	24	79.0	80.9	85.1	24	*******	*******	*******	**
14-JAN-90	11.9	12.4	12.7	24	85.6	88.7	91.3	24	*******	*******	*******	**
15-JAN-90	12.7	12.8	13.0	24	90.7	91.9	93.0	24	*******	*******	*******	**
16-JAN-90	12.0	12.5	13.0	24	86.3	89.6	93.0	24	*******	*******	*******	**
17-JAN-90	11.7	11.9	12.1	24	83.6	85.3	86.9	24	*******	*******	*******	**
18-JAN-90	11.5	11.6	11.7	24	83.0	83.6	84.5	24	*******	*******	*******	**
19-JAN-90	11.5	11.8	12.5	24	83.5	84.9	89.8	24	*******	*******	*******	**
20-JAN-90	12.5	12.8	12.9	24	89.8	91.8	92.7	24	*******	*******	*******	**
21-JAN-90	12.3	12.4	12.5	9	88.3	89.2	89.9	9	*******	*******	*******	**
22-JAN-90	12.5	12.7	12.9	24	89.4	91.0	92.2	24	*******	*******	*******	**
23-JAN-90	11.7	12.3	12.8	24	83.9	88.2	91.7	24	*******	*******	*******	**
24-JAN-90	11.7	11.8	11.9	24	83.9	84.4	85.0	24	*******	*******	*******	**
25-JAN-90	11.6	11.8	11.9	24	83.4	84.4	85.5	24	*******	*******	*******	**
26-JAN-90	11.7	12.0	12.4	24	85.5	87.0	90.0	24	*******	*******	*******	**
27-JAN-90	11.7	11.9	12.0	24	85.5	86.1	87.2	24	*******	*******	*******	**
28-JAN-90	11.3	11.5	11.8	24	81.6	83.4	85.5	24	*******	*******	*******	**
29-JAN-90	11.3	11.4	11.5	24	81.7	82.6	83.7	24	*******	*******	*******	**
30-JAN-90	11.3	11.8	12.5	24	82.2	85.2	89.3	24	*******	*******	*******	**
31-JAN-90	11.7	12.2	12.8	24	83.6	87.5	92.0	24	*******	*******	*******	**
GRAND MONTHLY MEAN	11.7	11.9	12.2		83.8	85.5	87.5		0.0	0.0	0.0	

\# A day with less than 24 values.

**** No data values for that day.

@ A value for dissolved oxygen is approaching the objective.
(5.0 mg/l or 60% saturation)

? Daily mean flow is below 750 cf/s.

Calibration Certification: Thomas A Spranger Date: Sept 12/1990

SUMMARY OF DAILY AMQN VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-FEB-90 to 28-FEB-90

DAY	TEMPERATURE C				pH units				SPECIFIC CONDUCTANCE us/cm			
	MIN.	MEAN	MAX.	NRS	MIN.	MEAN	MAX.	NRS	MIN.	MEAN	MAX.	NRS
1-FEB-90	0.4	0.5	0.8	24	6.8	6.8	7.0	24	89.8	97.2	105.5	24
2-FEB-90	0.8	0.8	0.8	24	6.9	7.0	7.1	24	74.2	89.5	101.6	24
3-FEB-90	0.4	0.4	0.8	24	6.9	7.0	7.1	24	93.7	97.0	101.6	24
4-FEB-90	0.4	0.4	0.4	24	6.9	6.9	6.9	24	89.8	92.1	93.7	24
5-FEB-90	0.4	0.4	0.4	24	6.9	6.9	6.9	24	89.8	94.5	97.6	24
6-FEB-90	0.4	0.4	0.4	23	6.9	6.9	6.9	23	93.7	95.3	97.6	23
7-FEB-90	0.4	0.4	0.4	19	6.9	6.9	6.9	19	97.6	99.3	101.6	19
8-FEB-90	0.4	0.4	0.8	24	6.9	6.9	7.0	24	89.8	96.7	101.6	24
9-FEB-90	0.4	0.7	1.2	24	6.8	6.8	6.9	24	82.0	83.8	89.8	24
10-FEB-90	1.2	1.3	1.6	24	6.9	6.9	7.0	24	85.9	93.7	97.6	24
11-FEB-90	0.8	1.1	1.6	24	6.9	6.9	6.9	24	93.7	96.0	101.6	24
12-FEB-90	0.4	0.9	1.6	24	6.8	6.8	6.9	24	82.0	86.2	93.7	24
13-FEB-90	0.4	0.7	1.2	23	6.7	6.8	6.8	23	78.1	81.9	82.0	23
14-FEB-90	0.8	1.3	1.6	24	6.7	6.7	6.7	24	82.0	82.0	82.0	24
15-FEB-90	0.4	0.5	1.6	24	6.7	6.7	6.7	24	78.1	81.7	82.0	24
16-FEB-90	0.4	0.5	0.8	24	6.7	6.7	6.7	24	82.0	83.6	85.9	24
17-FEB-90	0.8	1.0	1.2	18	6.7	6.7	6.8	18	82.0	83.5	85.9	18
18-FEB-90	0.4	0.4	0.8	24	6.7	6.7	6.8	24	82.0	86.1	89.8	24
19-FEB-90	0.4	0.6	1.2	24	6.7	6.7	6.7	24	78.1	81.9	82.0	24
20-FEB-90	0.4	0.5	1.2	24	6.7	6.7	6.8	24	78.1	81.9	85.9	24
21-FEB-90	0.4	0.4	0.4	24	6.7	6.7	6.7	24	78.1	81.7	85.9	24
22-FEB-90	0.4	0.6	0.8	24	6.7	6.7	6.7	24	78.1	78.1	78.1	24
23-FEB-90	1.2	1.4	1.6	24	6.7	6.7	6.7	24	74.2	77.8	78.1	24
24-FEB-90	0.4	0.6	1.2	24	6.7	6.7	6.7	24	74.2	76.8	78.1	24
25-FEB-90	0.4	0.5	0.8	24	6.7	6.7	6.7	24	74.2	75.7	78.1	24
26-FEB-90	0.4	0.5	0.8	24	6.7	6.7	6.7	24	74.2	76.5	78.1	24
27-FEB-90	0.4	0.4	0.4	24	6.6	6.7	6.7	24	74.2	77.1	78.1	24
28-FEB-90	0.4	0.5	0.8	24	6.7	6.7	6.7	24	78.1	78.1	78.1	24
GRAND MONTHLY MEAN	0.5	0.6	1.0		6.8	6.8	6.8		82.4	85.9	89.0	

\# A day with less than 24 values.

**** No data values for that day.

SUMMARY OF DAILY AMOM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-FEB-90 to 28-FEB-90

DAY	DISSOLVED OXYGEN mg/l				DISSOLVED OXYGEN % saturation				FLOW cf/s			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-FEB-90	11.7	11.8	12.0	24	83.6	84.6	85.9	24	*******	*******	*******	**
2-FEB-90	11.7	11.8	12.4	24	84.5	85.4	89.7	24	*******	*******	*******	**
3-FEB-90	12.5	12.7	12.8	24	89.8	90.9	91.5	24	*******	*******	*******	**
4-FEB-90	12.6	12.7	12.8	24	90.5	91.1	91.6	24	*******	*******	*******	**
5-FEB-90	12.6	12.7	12.8	24	90.5	90.9	91.6	24	*******	*******	*******	**
6-FEB-90	11.9	12.5	12.7	23	85.6	89.6	91.1	23	*******	*******	*******	**
7-FEB-90	11.6	12.0	12.3	19	83.4	85.7	87.8	19	*******	*******	*******	**
8-FEB-90	11.5	11.6	11.7	24	82.3	83.2	84.9	24	*******	*******	*******	**
9-FEB-90	11.6	11.6	11.7	24	82.9	84.0	85.4	24	*******	*******	*******	**
10-FEB-90	11.5	11.6	11.7	24	84.2	85.3	86.8	24	*******	*******	*******	**
11-FEB-90	11.5	11.6	11.7	24	84.0	84.9	86.4	24	*******	*******	*******	**
12-FEB-90	11.5	11.6	11.7	24	83.1	84.5	86.0	24	*******	*******	*******	**
13-FEB-90	11.7	12.1	13.2	23	85.1	87.5	95.3	23	*******	*******	*******	**
14-FEB-90	11.7	11.9	12.1	24	86.1	87.3	89.4	24	*******	*******	*******	**
15-FEB-90	11.8	12.3	12.6	24	86.4	88.3	90.0	24	*******	*******	*******	**
16-FEB-90	11.9	12.1	12.2	24	85.0	86.8	88.7	24	*******	*******	*******	**
17-FEB-90	11.8	11.9	12.1	18	85.4	86.8	88.7	18	*******	*******	*******	**
18-FEB-90	12.1	12.6	12.9	24	87.8	90.6	92.4	24	*******	*******	*******	**
19-FEB-90	11.8	12.5	12.8	24	86.2	89.9	91.4	24	*******	*******	*******	**
20-FEB-90	11.8	12.5	12.9	24	86.5	90.2	92.7	24	*******	*******	*******	**
21-FEB-90	12.6	12.9	13.2	24	90.5	92.3	94.3	24	*******	*******	*******	**
22-FEB-90	12.1	12.4	12.6	24	87.6	89.6	90.6	24	*******	*******	*******	**
23-FEB-90	11.9	11.9	12.0	24	87.5	87.9	88.5	24	*******	*******	*******	**
24-FEB-90	11.9	12.2	12.6	24	86.8	88.1	90.2	24	*******	*******	*******	**
25-FEB-90	12.4	12.6	12.8	24	89.7	90.8	91.9	24	*******	*******	*******	**
26-FEB-90	12.7	13.0	13.2	24	91.9	93.4	94.3	24	2992.2	2992.2	2992.2	3
27-FEB-90	12.9	13.0	13.1	24	92.2	93.4	93.8	24	2963.0	2995.5	3051.2	24
28-FEB-90	12.1	12.3	12.8	24	86.6	88.1	91.6	24	2905.2	2940.1	2963.0	24
GRAND MONTHLY MEAN	12.0	12.2	12.5		86.6	88.3	90.1		2953.5	2975.9	3002.1	

@ A day with less than 24 values.

**** No data values for that day.

a A value for dissolved oxygen is approaching the objective.
(5.0 mg/l or 60% saturation)

? Daily mean flow is below 730 cf/s.

Calibration Certification: Thomas A. Sprague Date: Sept 12/1990

SUMMARY OF DAILY AMGM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-MAR-90 to 31-MAR-90

DAY	TEMPERATURE C				pH units				SPECIFIC CONDUCTANCE us/cm			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-MAR-90	0.4	0.5	0.8	24	6.7	6.7	6.7	24	78.1	79.9	82.0	24
2-MAR-90	0.4	0.7	1.2	24	6.7	6.7	6.7	24	78.1	78.1	78.1	24
3-MAR-90	0.8	1.3	2.0	24	6.7	6.7	6.7	24	78.1	78.3	82.0	24
4-MAR-90	0.8	1.1	2.0	24	6.7	6.7	6.7	24	74.2	77.3	78.1	24
5-MAR-90	0.4	0.8	1.2	24	6.7	6.7	6.7	24	74.2	75.3	78.1	24
6-MAR-90	0.4	0.7	1.2	24	6.7	6.7	6.7	24	74.2	77.3	78.1	24
7-MAR-90	0.4	0.6	0.8	24	6.7	6.7	6.7	24	74.2	76.3	78.1	24
8-MAR-90	0.4	0.7	1.2	24	6.7	6.7	6.7	24	74.2	74.7	78.1	24
9-MAR-90	0.8	1.2	2.0	24	6.6	6.7	6.8	24	74.2	75.2	77.0	24
10-MAR-90	0.6	1.4	2.3	24	6.6	6.6	6.6	24	77.0	79.4	81.0	24
11-MAR-90	1.3	2.0	2.7	24	6.6	6.6	6.7	24	74.0	78.8	82.0	24
12-MAR-90	1.0	1.9	2.9	24	6.6	6.6	6.6	24	76.0	76.5	78.0	24
13-MAR-90	1.7	2.0	2.9	24	6.6	6.6	6.7	24	75.0	76.3	77.0	24
14-MAR-90	1.6	1.9	2.3	24	6.6	6.7	6.7	24	74.0	75.3	76.0	24
15-MAR-90	1.7	1.8	2.3	24	6.6	6.7	6.7	24	74.0	78.6	83.0	24
16-MAR-90	1.5	1.7	2.1	24	6.6	6.7	6.7	24	74.0	75.5	77.0	24
17-MAR-90	1.6	1.9	2.4	24	6.6	6.7	6.7	24	72.0	72.9	74.0	24
18-MAR-90	1.8	2.1	2.5	24	6.6	6.6	6.7	24	69.0	70.8	72.0	24
19-MAR-90	1.1	1.6	2.8	20	6.6	6.6	6.6	20	66.0	67.6	69.0	20
20-MAR-90	1.3	1.7	2.4	22	6.6	6.6	6.6	22	58.0	59.0	60.0	22
21-MAR-90	1.7	1.9	2.3	24	6.5	6.6	6.6	24	53.0	56.3	58.0	24
22-MAR-90	1.3	1.8	2.8	24	6.5	6.5	6.5	24	52.0	52.1	53.0	24
23-MAR-90	1.6	2.0	2.5	24	6.5	6.5	6.5	24	47.0	49.3	52.0	24
24-MAR-90	1.0	1.5	2.2	24	6.5	6.5	6.5	24	44.0	45.3	48.0	24
25-MAR-90	1.0	1.7	3.0	24	6.5	6.5	6.5	24	47.0	47.8	49.0	24
26-MAR-90	1.4	2.2	3.3	24	6.5	6.5	6.5	24	48.0	48.9	50.0	24
27-MAR-90	1.0	1.8	2.7	24	6.5	6.5	6.5	24	50.0	50.7	54.0	24
28-MAR-90	0.8	1.5	2.4	24	6.6	6.6	6.6	24	54.0	58.0	61.0	24
29-MAR-90	0.7	1.6	2.7	24	6.6	6.6	6.6	24	61.0	63.5	66.0	24
30-MAR-90	1.2	2.1	3.4	24	6.6	6.6	6.7	24	65.0	66.2	67.0	24
31-MAR-90	1.8	2.3	3.2	24	6.6	6.6	6.6	24	64.0	64.2	65.0	24
GRAND MONTHLY MEAN	1.1	1.5	2.3		6.6	6.6	6.6		66.2	67.9	69.7	

@ A day with less than 24 values.

**** No data values for that day.

SUMMARY OF DAILY ANOM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-MAR-90 to 31-MAR-90

DAY	DISSOLVED OXYGEN mg/l				DISSOLVED OXYGEN % saturation				FLOW cf/s			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-MAR-90	12.3	12.5	12.8	24	87.8	89.9	91.7	24	2876.5	2965.2	3126.0	24
2-MAR-90	12.1	12.2	12.3	24	86.8	88.0	88.8	24	2876.5	2882.2	2890.8	24
3-MAR-90	12.1	12.2	12.3	24	87.8	89.5	92.0	24	2890.8	2926.7	2948.5	24
4-MAR-90	12.2	12.3	12.5	24	89.1	90.0	92.0	24	2934.0	2958.2	2963.0	24
5-MAR-90	12.5	12.7	12.9	24	90.4	92.0	94.1	24	2934.0	2949.4	2963.0	24
6-MAR-90	12.8	12.9	13.1	24	92.2	93.3	94.3	24	2934.0	2947.3	2974.0	24
7-MAR-90	12.9	13.1	13.2	24	92.8	94.1	95.0	24	2934.0	2962.9	3043.8	24
8-MAR-90	12.7	12.9	13.2	24	92.3	93.7	95.0	24	2919.6	2939.2	2992.2	24
9-MAR-90	12.3	12.6	12.9	24	90.3	92.4	94.4	24	2301.3	2678.5	2923.2	18
10-MAR-90	12.2	12.3	12.4	24	88.7	90.6	92.7	24	*******	*******	*******	**
11-MAR-90	11.8	12.1	12.3	24	88.8	90.4	92.7	24	*******	*******	*******	**
12-MAR-90	11.7	11.9	12.0	24	86.9	88.5	90.6	24	*******	*******	*******	**
13-MAR-90	11.6	11.7	11.8	24	87.0	88.1	89.9	24	*******	*******	*******	**
14-MAR-90	11.7	11.8	11.9	24	86.9	88.5	90.1	24	*******	*******	*******	**
15-MAR-90	11.7	11.8	11.9	24	88.0	88.3	89.4	24	*******	*******	*******	**
16-MAR-90	11.8	11.9	12.0	24	87.6	88.3	89.1	24	*******	*******	*******	**
17-MAR-90	11.7	11.8	11.9	24	87.2	88.1	89.1	24	*******	*******	*******	**
18-MAR-90	11.5	11.6	11.8	24	85.8	87.2	88.7	24	*******	*******	*******	**
19-MAR-90	11.7	11.9	12.1	20	86.2	87.8	92.7	20	*******	*******	*******	**
20-MAR-90	12.1	12.1	12.2	22	89.0	90.4	92.0	22	*******	*******	*******	**
21-MAR-90	12.1	12.2	12.3	24	90.1	91.1	91.6	24	7233.2	7307.0	7359.7	3
22-MAR-90	12.3	12.4	12.4	24	91.2	92.6	95.3	24	6867.7	7034.6	7366.1	24
23-MAR-90	12.3	12.5	12.5	24	92.3	93.2	94.4	24	6861.6	7312.3	8761.9	24
24-MAR-90	12.5	12.9	13.1	24	93.4	95.0	96.9	24	6626.4	8344.8	9470.6	24
25-MAR-90	12.6	12.8	12.9	24	93.2	94.8	97.7	24	6549.0	6625.5	6837.3	24
26-MAR-90	12.4	12.6	12.7	24	93.3	94.7	97.0	24	6366.7	6493.2	6554.9	24
27-MAR-90	12.4	12.7	12.8	24	92.6	94.5	96.9	24	4768.0	5899.3	6501.7	24
28-MAR-90	12.4	12.6	12.7	24	91.3	93.2	95.7	24	3599.3	4329.7	4753.3	24
29-MAR-90	12.3	12.5	12.7	24	90.7	93.1	96.6	24	3550.1	3591.3	3615.9	24
30-MAR-90	12.5	12.5	12.6	24	91.3	93.9	97.0	24	3546.0	3722.0	3956.2	24
31-MAR-90	12.4	12.5	12.5	24	92.9	94.1	96.5	24	3852.1	3900.4	3938.7	24
GRAND MONTHLY MEAN	12.2	12.3	12.5		89.8	91.3	93.2		4281.0	4538.5	4797.0	

\$ A day with less than 24 values.

**** No data values for that day.

@ A value for dissolved oxygen is approaching the objective. (5.0 mg/l or 60% saturation)

? Daily mean flow is below 750 cf/s.

Calibration Certification: Thomas Springer Date: Sept 12/90

SUMMARY OF DAILY AMBIENT VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-APR-90 to 30-APR-90

DAY	TEMPERATURE C				pH units				SPECIFIC CONDUCTANCE us/cm			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-APR-90	2.4	2.7	3.2	24	6.6	6.6	6.6	24	64.0	64.6	65.0	24
2-APR-90	2.8	3.1	3.5	24	6.6	6.6	6.6	24	66.0	68.8	70.0	24
3-APR-90	3.0	3.5	4.6	24	6.6	6.6	6.7	24	69.0	70.0	71.0	24
4-APR-90	3.9	4.3	4.7	24	6.7	6.7	6.7	24	67.0	70.1	71.0	24
5-APR-90	3.8	4.0	4.4	24	6.6	6.6	6.7	24	53.0	54.0	63.0	24
6-APR-90	3.5	3.9	4.5	24	6.6	6.6	6.7	24	47.0	49.3	52.0	24
7-APR-90	3.3	3.6	4.2	24	6.6	6.6	6.6	24	45.0	46.2	48.0	24
8-APR-90	2.6	3.3	4.4	24	6.6	6.6	6.6	24	49.0	49.3	52.0	24
9-APR-90	2.8	3.8	5.4	24	6.6	6.6	6.6	24	52.0	52.8	54.0	24
10-APR-90	4.1	4.5	5.3	24	6.6	6.7	6.7	24	52.0	54.8	56.0	24
11-APR-90	4.1	4.2	4.3	24	6.6	6.7	6.7	24	48.0	49.1	51.0	24
12-APR-90	3.5	4.1	5.0	24	6.7	6.7	6.7	24	48.0	48.9	51.0	24
13-APR-90	3.5	4.4	5.7	24	6.7	6.7	6.8	24	48.0	51.5	52.0	24
14-APR-90	4.1	5.1	6.3	20	6.7	6.8	6.8	20	52.0	52.9	53.0	20
15-APR-90	5.0	5.3	5.7	19	6.7	6.8	6.8	19	52.0	53.3	54.0	19
16-APR-90	5.5	5.6	6.3	17	6.8	6.8	6.8	17	53.0	53.9	55.0	17
17-APR-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
18-APR-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
19-APR-90	5.2	6.0	7.3	16	6.8	6.8	6.9	16	52.0	52.6	54.0	16
20-APR-90	5.4	6.1	6.9	22	6.9	6.9	6.9	22	54.0	54.6	55.0	22
21-APR-90	6.0	6.3	6.7	24	6.9	6.9	6.9	24	55.0	55.1	56.0	24
22-APR-90	6.4	7.1	8.3	24	6.9	6.9	6.9	24	56.0	56.3	59.0	24
23-APR-90	7.0	7.7	8.6	24	6.8	6.9	7.0	24	59.0	64.8	69.0	24
24-APR-90	7.3	8.3	9.7	24	6.9	6.9	7.0	24	62.0	65.3	69.0	24
25-APR-90	7.7	8.8	9.8	24	6.9	6.9	6.9	24	57.0	59.9	63.0	24
26-APR-90	8.4	9.5	11.4	24	6.8	6.9	6.9	24	57.0	57.6	59.0	24
27-APR-90	9.5	10.8	12.9	21	6.8	6.9	6.9	21	55.0	55.7	59.0	21
28-APR-90	11.3	12.1	12.9	24	6.8	6.8	6.9	24	52.0	54.1	57.0	24
29-APR-90	11.0	11.5	12.5	24	6.9	6.9	7.0	24	57.0	62.8	68.0	24
30-APR-90	10.8	11.5	13.1	24	6.9	6.9	7.0	24	68.0	69.0	70.0	24
GRAND MONTHLY MEAN	5.5	6.1	7.1		6.7	6.8	6.8		55.3	57.0	59.1	

0 A day with less than 24 values.

**** No data values for that day.

SUMMARY OF DAILY AWQM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-APR-90 to 30-APR-90

DAY	DISSOLVED OXYGEN mg/l				DISSOLVED OXYGEN % saturation				FLOW cf/s			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-APR-90	12.2	12.3	12.4	24	92.6	93.7	94.9	24	3420.8	3706.8	3852.1	24
2-APR-90	12.0	12.1	12.2	24	91.9	93.4	95.3	24	3485.1	3616.8	3715.9	24
3-APR-90	12.0	12.2	12.5	24	92.5	95.1	100.6	24	3715.9	3729.5	3749.7	24
4-APR-90	12.2	12.3	12.5	24	97.2	98.5	100.3	24	3732.8	4779.1	7872.3	24
5-APR-90	12.3	12.4	12.6	24	97.4	98.7	100.3	24	6984.2	7394.4	8275.6	24
6-APR-90	12.6	12.7	12.8	24	98.8	100.0	102.3	24	8173.6	8286.0	8419.7	24
7-APR-90	12.7	12.8	12.9	24	99.4	100.3	101.5	24	6384.2	7483.8	8173.6	24
8-APR-90	12.8	12.8	13.0	24	97.6	99.6	102.2	24	5134.2	5932.7	6478.1	24
9-APR-90	12.3	12.7	12.9	24	98.0	99.9	102.4	24	3333.7	4490.3	5134.2	24
10-APR-90	12.3	12.4	12.5	24	97.7	99.2	101.6	24	3420.8	4497.1	6355.1	24
11-APR-90	12.2	12.3	12.5	24	97.3	98.3	99.9	24	6039.5	6311.3	6740.4	24
12-APR-90	12.3	12.4	12.5	24	96.4	98.2	101.1	24	5310.4	6478.8	6813.0	24
13-APR-90	12.3	12.4	12.5	24	96.5	99.1	103.1	24	5299.9	5319.7	5341.8	24
14-APR-90	12.4	12.5	12.5	20	98.1	101.1	104.6	20	5175.3	5261.5	5299.9	24
15-APR-90	12.2	12.3	12.3	19	99.8	100.5	101.6	19	5134.2	5169.0	5273.8	24
16-APR-90	12.0	12.1	12.2	17	98.8	99.9	101.7	17	5315.6	5746.6	7442.6	24
17-APR-90	****	****	****	**	*****	*****	*****	**	7183.0	7322.7	7461.8	24
18-APR-90	****	****	****	**	*****	*****	*****	**	5232.2	6564.5	7359.7	24
19-APR-90	11.9	12.2	12.5	16	97.6	101.3	107.4	16	5175.3	5203.3	5216.7	24
20-APR-90	12.3	12.3	12.4	22	100.7	102.9	105.7	22	5134.2	5167.6	5201.1	24
21-APR-90	12.1	12.1	12.3	24	100.8	102.1	104.3	24	5093.3	5143.4	5175.3	24
22-APR-90	11.7	11.9	12.1	24	100.4	102.5	104.8	24	4178.7	4787.1	5154.7	24
23-APR-90	10.3	10.8	11.7	24	88.6	94.0	103.3	24	3357.3	3446.6	3826.3	24
24-APR-90	10.3	10.4	10.5	24	88.6	92.1	96.2	24	2919.6	3127.3	3389.0	24
25-APR-90	10.2	10.3	10.5	24	89.8	92.7	96.4	24	3103.4	3383.9	3582.9	24
26-APR-90	10.0	10.2	10.3	24	88.9	92.8	97.9	24	3599.3	3781.0	4151.6	24
27-APR-90	9.8	10.0	10.1	21	90.1	93.9	99.3	21	3852.1	3986.5	4111.1	24
28-APR-90	9.6	9.7	9.9	24	91.3	94.2	97.8	24	3822.0	3876.5	3886.6	24
29-APR-90	9.4	9.6	9.8	24	90.1	92.0	95.2	24	3749.7	3796.3	3817.8	24
30-APR-90	9.5	9.6	9.8	24	88.8	92.0	96.3	24	3699.1	3731.7	3749.7	24
GRAND MONTHLY MEAN	11.6	11.7	11.9		95.2	97.4	100.6		4672.0	5050.7	5500.7	

\# A day with less than 24 values.

**** No data values for that day.

@ A value for dissolved oxygen is approaching the objective. (5.0 mg/l or 60% saturation)

? Daily mean flow is below 750 cf/s.

Calibration Certification: Thomas Springer Date: Sept 11, 1990

SUMMARY OF DAILY AMOM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-MAY-90 to 31-MAY-90

DAY	TEMPERATURE C				pH units				SPECIFIC CONDUCTANCE us/cm			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-MAY-90	11.8	12.4	13.2	24	6.9	7.0	7.0	24	70.0	73.5	75.0	24
2-MAY-90	12.4	13.0	13.8	24	6.9	7.0	7.0	24	73.0	74.6	75.0	24
3-MAY-90	11.7	12.8	14.1	24	6.9	7.0	7.0	24	73.0	74.3	75.0	24
4-MAY-90	12.1	13.1	14.1	24	6.9	7.0	7.0	24	73.0	74.5	76.0	24
5-MAY-90	12.0	12.7	14.1	24	6.9	7.0	7.0	24	76.0	77.9	79.0	24
6-MAY-90	11.1	11.5	12.2	24	7.0	7.0	7.1	24	80.0	84.2	88.0	24
7-MAY-90	11.1	12.0	13.2	24	7.0	7.0	7.1	24	77.0	78.0	81.0	24
8-MAY-90	11.6	12.5	13.5	24	6.9	7.0	7.0	24	76.0	77.4	78.0	24
9-MAY-90	12.1	13.0	14.6	24	6.9	7.0	7.0	24	78.0	81.2	84.0	24
10-MAY-90	13.0	13.5	14.6	23	6.9	7.0	7.0	21	78.0	82.5	86.0	21
11-MAY-90	13.1	13.6	14.5	24	7.0	7.0	7.0	24	77.0	86.8	95.0	24
12-MAY-90	12.2	13.5	15.1	24	6.9	6.9	7.0	24	75.0	75.8	77.0	24
13-MAY-90	13.0	13.6	15.0	23	6.9	6.9	7.0	23	76.0	76.9	78.0	23
14-MAY-90	13.0	13.8	14.2	7	6.8	6.8	6.8	7	64.0	67.3	73.0	7
15-MAY-90	12.9	13.9	15.4	24	6.7	6.8	6.8	24	63.0	63.5	66.0	24
16-MAY-90	13.6	14.6	15.7	24	6.7	6.8	6.8	24	64.0	67.0	68.0	24
17-MAY-90	14.1	14.8	15.7	24	6.7	6.8	6.8	24	64.0	65.7	67.0	24
18-MAY-90	13.5	14.3	15.1	11	6.8	6.8	6.8	11	67.0	67.0	67.0	11
19-MAY-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
20-MAY-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
21-MAY-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
22-MAY-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
23-MAY-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
24-MAY-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
25-MAY-90	10.0	11.3	11.9	10	6.8	6.8	6.8	10	54.0	54.8	55.0	10
26-MAY-90	10.2	11.6	13.3	20	6.8	6.8	6.8	20	53.0	53.9	55.0	20
27-MAY-90	11.8	13.0	14.7	24	6.7	6.7	6.8	24	54.0	54.3	56.0	24
28-MAY-90	13.0	14.3	16.4	24	6.7	6.7	6.8	24	56.0	58.4	61.0	24
29-MAY-90	14.5	15.3	16.2	24	6.7	6.7	6.8	24	61.0	64.7	69.0	24
30-MAY-90	14.1	15.0	16.1	20	6.8	6.8	6.8	20	69.0	71.4	72.0	20
31-MAY-90	14.8	15.0	15.1	4	6.7	6.7	6.7	4	45.0	45.0	45.0	4
GRAND MONTHLY MEAN	12.5	13.4	14.5		6.8	6.9	6.9		67.8	70.0	72.0	

@ A day with less than 24 values.

**** No data values for that day.

SUMMARY OF DAILY AMOM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-MAY-90 to 31-MAY-90

DAY	DISSOLVED OXYGEN mg/l				DISSOLVED OXYGEN % saturation				FLOW cf/s			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-MAY-90	9.4	9.5	9.7	24	90.4	93.0	95.9	24	3632.4	3658.2	3699.1	24
2-MAY-90	9.3	9.4	9.6	24	90.8	93.4	97.1	24	3566.5	3597.5	3632.4	24
3-MAY-90	9.3	9.5	9.7	24	89.6	93.7	99.1	24	3468.9	3517.7	3566.5	24
4-MAY-90	9.4	9.5	9.7	24	90.7	94.2	98.1	24	3144.8	3405.7	3468.9	15
5-MAY-90	9.3	9.4	9.5	24	90.5	92.1	96.4	24	*******	*******	*******	**
6-MAY-90	9.3	9.5	9.7	24	87.9	90.7	94.4	24	*******	*******	*******	**
7-MAY-90	9.5	9.6	9.8	24	90.1	93.3	97.0	24	*******	*******	*******	**
8-MAY-90	9.5	9.6	9.8	24	91.5	94.5	97.8	24	*******	*******	*******	**
9-MAY-90	9.5	9.6	9.7	24	91.8	95.1	99.6	24	*******	*******	*******	**
10-MAY-90	9.1	9.3	9.6	23	90.2	93.5	98.6	23	*******	*******	*******	**
11-MAY-90	9.2	9.2	9.3	24	91.1	92.6	95.7	24	2657.4	3228.5	3749.7	24
12-MAY-90	9.1	9.4	9.6	24	89.8	93.9	99.5	24	3263.5	3385.0	3550.1	24
13-MAY-90	9.2	9.3	9.4	23	92.0	93.7	97.8	23	2934.0	3215.3	3420.8	24
14-MAY-90	9.4	9.5	9.6	7	92.7	96.2	97.7	7	3448.8	4377.9	5211.5	24
15-MAY-90	9.3	9.4	9.6	24	92.1	95.4	98.9	24	3886.6	4417.6	4921.5	24
16-MAY-90	9.2	9.3	9.6	24	92.5	96.1	100.7	24	3995.7	4351.9	4694.8	24
17-MAY-90	9.2	9.3	9.5	24	93.5	96.6	99.8	24	4224.1	4329.6	4460.3	24
18-MAY-90	9.4	9.4	9.5	11	94.0	95.9	98.3	11	4205.9	4617.8	5129.1	24
19-MAY-90	****	****	****	**	*****	*****	*****	**	4151.6	4660.2	5052.5	24
20-MAY-90	****	****	****	**	*****	*****	*****	**	3325.9	3792.2	4151.6	24
21-MAY-90	****	****	****	**	*****	*****	*****	**	3263.5	3288.5	3325.9	24
22-MAY-90	****	****	****	**	*****	*****	*****	**	3279.0	3341.2	3436.8	24
23-MAY-90	****	****	****	**	*****	*****	*****	**	3444.8	3979.4	5180.5	24
24-MAY-90	****	****	****	**	*****	*****	*****	**	5221.8	5788.1	6478.1	24
25-MAY-90	10.0	10.4	10.5	10	92.0	98.4	100.7	10	6084.8	6135.8	6216.2	24
26-MAY-90	10.0	10.2	10.3	20	93.9	97.6	101.2	20	5904.8	6015.2	6079.1	24
27-MAY-90	9.4	9.7	10.0	24	93.3	96.0	99.0	24	5103.5	5570.9	5904.8	24
28-MAY-90	9.0	9.2	9.4	24	91.1	94.4	98.6	24	4075.4	4781.3	5093.3	24
29-MAY-90	8.7	8.8	9.1	24	89.3	92.0	96.9	24	3217.2	3669.6	4057.6	24
30-MAY-90	8.4	8.5	8.7	20	86.8	88.4	92.6	20	3232.6	4145.9	8783.1	24
31-MAY-90	9.2	9.3	9.3	4	95.7	96.1	96.5	4	9163.4	10044.3	10342.0	23
GRAND MONTHLY MEAN	9.3	9.4	9.6		91.3	94.3	97.9		4075.9	4452.6	4944.2	

\# A day with less than 24 values.

**** No data values for that day.

@ A value for dissolved oxygen is approaching the objective.
(5.0 mg/l or 60% saturation)

? Daily mean flow is below 750 cf/s.

Calibration Certification: Thomas Springer Date: Sept 12/1990

SUMMARY OF DAILY AHOM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-JUN-90 to 30-JUN-90

DAY	TEMPERATURE C				pH units				SPECIFIC CONDUCTANCE us/cm			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-JUN-90	13.8	14.3	15.2	24	6.7	6.7	6.7	24	43.0	44.0	45.0	24
2-JUN-90	14.1	15.1	16.6	24	6.6	6.7	6.7	24	46.0	46.1	47.0	24
3-JUN-90	15.6	16.6	18.4	24	6.6	6.6	6.6	24	46.0	46.2	48.0	24
4-JUN-90	16.9	17.4	18.1	24	6.6	6.6	6.6	24	49.0	51.2	52.0	24
5-JUN-90	16.7	17.5	18.6	24	6.6	6.6	6.7	24	52.0	53.6	55.0	24
6-JUN-90	16.6	17.4	18.3	24	6.6	6.6	6.7	24	55.0	57.3	58.0	24
7-JUN-90	16.6	17.3	18.7	24	6.6	6.6	6.7	24	59.0	65.1	68.0	24
8-JUN-90	17.0	18.2	19.8	23	6.6	6.7	6.7	23	64.0	65.8	69.0	23
9-JUN-90	17.9	18.5	19.8	24	6.7	6.7	6.8	24	64.0	64.8	66.0	24
10-JUN-90	17.3	17.6	18.0	24	6.7	6.7	6.7	24	65.0	65.3	66.0	24
11-JUN-90	17.0	17.5	17.9	24	6.7	6.7	6.7	24	64.0	65.0	66.0	24
12-JUN-90	16.4	17.6	19.7	24	6.7	6.8	6.8	24	67.0	70.9	72.0	24
13-JUN-90	17.6	18.9	20.5	24	6.7	6.8	6.8	24	70.0	71.5	74.0	24
14-JUN-90	17.7	19.3	20.9	24	6.7	6.8	6.8	24	73.0	75.7	79.0	24
15-JUN-90	19.1	20.1	21.0	24	6.7	6.8	6.8	24	73.0	81.3	92.0	24
16-JUN-90	19.9	20.9	22.3	24	6.7	6.8	6.8	24	81.0	87.9	97.0	24
17-JUN-90	21.6	22.3	23.0	24	6.8	6.8	6.8	24	95.0	97.5	102.0	24
18-JUN-90	21.3	22.4	23.4	24	6.8	6.8	6.8	24	105.0	109.1	112.0	24
19-JUN-90	20.7	21.2	21.9	24	6.7	6.8	6.8	24	98.0	102.4	112.0	24
20-JUN-90	20.5	20.8	21.1	24	6.7	6.8	6.8	24	99.0	105.7	115.0	24
21-JUN-90	20.5	21.0	21.5	24	6.7	6.8	6.8	24	91.0	97.3	104.0	24
22-JUN-90	21.0	21.5	21.9	24	6.7	6.8	6.8	24	100.0	109.6	118.0	24
23-JUN-90	20.0	20.7	21.5	24	6.7	6.8	6.8	24	104.0	105.9	108.0	24
24-JUN-90	18.8	19.4	19.9	24	6.8	6.8	6.8	24	100.0	104.8	107.0	24
25-JUN-90	19.6	20.2	21.5	24	6.7	6.7	6.8	24	86.0	92.1	103.0	24
26-JUN-90	20.0	21.1	22.8	24	6.7	6.7	6.8	24	83.0	89.5	102.0	24
27-JUN-90	21.1	22.0	23.0	24	6.7	6.7	6.8	24	85.0	90.5	99.0	24
28-JUN-90	21.8	22.3	22.6	24	6.8	6.8	6.8	24	95.0	104.6	110.0	24
29-JUN-90	21.9	22.3	22.8	24	6.8	6.8	6.9	24	99.0	103.1	107.0	24
30-JUN-90	22.2	22.5	23.2	24	6.8	6.8	6.9	24	105.0	109.6	113.0	24
GRAND MONTHLY MEAN	18.7	19.5	20.5		6.7	6.7	6.8		77.2	81.1	85.5	

\# A day with less than 24 values.

**** No data values for that day.

SUMMARY OF DAILY AMQM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-JUN-90 to 30-JUN-90

DAY	DISSOLVED OXYGEN mg/l				DISSOLVED OXYGEN % saturation				FLOW cf/s			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-JUN-90	9.2	9.3	9.4	24	92.8	94.7	97.8	24	7468.3	9098.4	9757.6	24
2-JUN-90	9.2	9.2	9.3	24	93.5	95.9	100.1	24	7610.1	7994.4	8200.7	24
3-JUN-90	8.7	8.9	9.1	24	93.7	96.1	99.1	24	5777.4	7553.3	8173.6	24
4-JUN-90	8.1	8.4	8.6	24	89.6	91.6	95.3	24	5093.3	5974.1	6314.4	24
5-JUN-90	8.0	8.1	8.3	24	86.5	89.4	93.5	24	4812.3	5414.6	5662.5	24
6-JUN-90	7.9	8.1	8.2	24	85.6	88.5	91.7	24	3393.0	4522.3	4797.5	24
7-JUN-90	7.7	7.8	8.0	24	82.9	85.7	90.3	24	3325.9	3341.6	3365.2	24
8-JUN-90	7.7	7.9	8.1	24	83.7	88.0	93.7	23	3232.6	3264.4	3325.9	24
9-JUN-90	7.7	7.8	8.1	24	85.6	88.0	93.8	24	3232.6	3233.7	3244.2	24
10-JUN-90	7.6	7.8	7.9	24	83.5	85.5	88.1	24	3232.6	3233.1	3244.2	24
11-JUN-90	7.7	7.8	8.1	24	83.2	86.1	89.2	24	2443.2	2973.4	3232.6	24
12-JUN-90	7.9	8.0	8.2	24	84.4	88.2	94.4	24	2566.9	2687.1	2819.8	24
13-JUN-90	7.8	8.0	8.2	24	85.8	90.3	96.2	24	1779.3	2630.7	2926.8	24
14-JUN-90	7.7	7.9	8.2	24	85.1	90.8	96.8	24	1877.8	2550.4	2763.8	24
15-JUN-90	7.5	7.8	8.1	24	85.7	90.4	96.3	24	1752.1	1765.0	1801.7	24
16-JUN-90	7.5	7.7	7.9	24	87.4	91.0	94.7	24	1543.9	1699.3	1844.5	24
17-JUN-90	7.3	7.4	7.8	24	87.2	90.6	95.1	24	1288.7	1430.8	1629.7	24
18-JUN-90	7.1	7.3	7.5	24	85.7	89.0	93.2	24	1389.8	1568.2	1940.4	24
19-JUN-90	7.0	7.2	7.5	24	82.5	85.5	90.5	24	1232.0	1545.1	1786.7	24
20-JUN-90	7.0	7.1	7.2	24	82.3	83.9	85.9	24	1400.7	1629.0	1903.7	24
21-JUN-90	7.1	7.2	7.3	24	83.7	85.3	87.1	24	1163.9	1430.1	1684.2	24
22-JUN-90	6.9	7.0	7.2	24	81.3	84.1	87.6	24	1467.1	1553.2	1786.7	24
23-JUN-90	7.0	7.1	7.3	24	81.3	83.9	86.9	24	1559.9	1562.1	1562.2	24
24-JUN-90	7.4	7.4	7.6	24	83.5	85.3	86.8	24	902.3	1294.4	1537.0	24
25-JUN-90	7.3	7.4	7.5	24	84.1	86.5	90.0	24	1115.3	1398.3	1875.2	24
26-JUN-90	7.3	7.5	7.7	24	85.0	89.0	95.2	24	1159.9	1538.7	2021.1	18
27-JUN-90	7.3	7.5	7.7	24	87.2	90.8	95.6	24	1286.6	1440.3	1826.8	24
28-JUN-90	7.3	7.4	7.7	24	87.6	90.5	93.5	24	1331.4	1465.8	1679.5	24
29-JUN-90	7.3	7.4	7.7	24	87.9	90.7	94.5	24	1290.9	1340.7	1427.1	24
30-JUN-90	7.2	7.4	7.7	24	87.5	90.2	94.3	24	1083.3	1190.9	1348.6	24
GRAND MONTHLY MEAN	7.6	7.8	8.0		85.9	88.9	92.9		2560.4	2944.1	3182.8	

\# A day with less than 24 values.

**** No data values for that day.

@ A value for dissolved oxygen is approaching the objective. (5.0 mg/l or 60% saturation)

? Daily mean flow is below 750 cf/s.

Calibration Certification: Thomas A Springer Date: Sept 12/1990

SUMMARY OF DAILY ANOM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-JUL-90 to 31-JUL-90

DAY	TEMPERATURE C				pH units				SPECIFIC CONDUCTANCE us/cm			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-JUL-90	21.7	23.0	23.7	24	6.8	6.8	6.8	24	112.0	121.3	127.0	24
2-JUL-90	21.2	21.7	22.5	24	6.8	6.8	6.9	24	126.0	129.6	131.0	24
3-JUL-90	22.3	22.7	23.3	24	6.8	6.9	6.9	24	129.0	132.9	137.0	24
4-JUL-90	23.1	23.3	23.5	24	6.8	6.9	6.9	24	115.0	122.8	134.0	24
5-JUL-90	23.0	23.7	24.1	24	6.8	6.8	6.8	24	87.0	108.2	120.0	24
6-JUL-90	22.1	22.8	24.0	24	6.7	6.8	6.8	24	80.0	83.0	87.0	24
7-JUL-90	22.4	22.6	22.9	24	6.8	6.8	6.9	24	86.0	109.9	131.0	24
8-JUL-90	21.6	22.4	23.4	24	6.9	6.9	6.9	24	131.0	137.5	145.0	24
9-JUL-90	21.8	22.5	22.8	24	6.8	6.9	6.9	24	140.0	144.1	149.0	24
10-JUL-90	21.5	22.5	23.9	24	6.8	6.8	6.9	24	129.0	135.6	146.0	24
11-JUL-90	22.7	23.1	23.6	24	6.9	6.9	6.9	24	130.0	136.7	146.0	24
12-JUL-90	22.4	22.7	23.1	24	6.8	6.9	6.9	24	138.0	142.0	146.0	24
13-JUL-90	21.8	22.5	23.5	24	6.8	6.9	6.9	24	139.0	143.0	148.0	24
14-JUL-90	23.0	23.5	24.5	24	6.8	6.9	6.9	24	143.0	146.6	152.0	24
15-JUL-90	23.3	23.9	25.0	24	6.8	6.9	6.9	24	142.0	147.2	151.0	24
16-JUL-90	24.2	24.5	24.9	24	6.7	6.8	6.9	24	126.0	139.1	149.0	24
17-JUL-90	24.3	24.9	26.0	24	6.7	6.8	6.9	24	124.0	130.2	142.0	24
18-JUL-90	25.2	25.8	27.0	24	6.8	6.9	6.9	24	141.0	144.5	150.0	24
19-JUL-90	26.0	26.3	26.7	24	6.8	6.9	6.9	24	134.0	140.4	147.0	24
20-JUL-90	25.9	26.0	26.0	5	6.9	6.9	6.9	5	130.0	134.6	138.0	5
21-JUL-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
22-JUL-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
23-JUL-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
24-JUL-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
25-JUL-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
26-JUL-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
27-JUL-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
28-JUL-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
29-JUL-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
30-JUL-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
31-JUL-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
GRAND MONTHLY MEAN	23.0	23.5	24.2		6.8	6.9	6.9		124.1	131.5	138.8	

* A day with less than 24 values.

**** No data values for that day.

SUMMARY OF DAILY AMOM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-JUL-90 to 31-JUL-90

DAY	DISSOLVED OXYGEN mg/l				DISSOLVED OXYGEN % saturation				FLOW cf/s			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-JUL-90	6.8	7.0	7.3	24	82.0	87.2	91.7	24	1036.0	1048.1	1083.3	24
2-JUL-90	6.8	7.1	7.2	24	81.6	85.2	87.3	24	943.6	1023.5	1051.7	24
3-JUL-90	7.1	7.3	7.4	24	87.2	89.3	90.9	24	962.6	1076.1	1246.6	24
4-JUL-90	7.0	7.1	7.5	24	86.5	88.9	93.0	24	1221.6	1227.3	1229.9	24
5-JUL-90	6.8	7.1	7.6	24	83.9	89.0	95.8	24	1221.6	2015.6	2243.9	24
6-JUL-90	7.1	7.3	7.6	24	86.1	90.3	95.8	24	906.1	1443.7	2231.8	24
7-JUL-90	7.2	7.4	7.5	24	88.2	90.7	92.3	24	898.6	931.7	960.7	24
8-JUL-90	7.2	7.3	7.4	24	87.9	89.5	91.5	24	898.6	900.7	906.1	24
9-JUL-90	6.9	7.2	7.4	24	82.7	88.2	91.7	24	898.6	998.3	1188.5	24
10-JUL-90	6.9	7.1	7.2	24	82.4	87.1	90.4	24	966.4	1034.8	1182.4	24
11-JUL-90	7.1	7.2	7.3	24	87.7	89.3	90.6	24	958.8	967.6	974.0	24
12-JUL-90	6.8	7.1	7.3	24	83.4	87.9	89.7	24	960.7	966.6	972.1	24
13-JUL-90	6.9	7.1	7.3	24	84.1	87.2	89.2	24	930.4	939.0	962.6	24
14-JUL-90	6.9	7.1	7.3	24	87.0	89.0	90.9	24	936.0	940.5	943.6	24
15-JUL-90	6.7	7.0	7.3	24	84.7	88.7	91.5	24	943.6	981.6	1232.0	24
16-JUL-90	6.5	6.8	7.1	24	82.3	86.4	90.8	24	936.0	1136.2	1246.6	24
17-JUL-90	6.7	6.9	7.0	24	86.2	89.2	92.0	24	928.5	934.1	936.0	24
18-JUL-90	6.5	6.9	7.1	24	85.9	90.3	92.1	24	928.5	982.9	1263.4	24
19-JUL-90	6.3	6.7	6.9	24	83.5	88.1	91.6	24	928.5	1265.2	2133.3	24
20-JUL-90	6.8	6.8	6.8	5	89.8	89.9	89.9	5	943.6	983.4	1405.1	24
21-JUL-90	****	****	****	**	*****	*****	*****	**	943.6	944.5	951.2	24
22-JUL-90	****	****	****	**	*****	*****	*****	**	943.6	945.8	958.8	24
23-JUL-90	****	****	****	**	*****	*****	*****	**	926.6	971.8	1203.0	24
24-JUL-90	****	****	****	**	*****	*****	*****	**	898.6	933.6	1157.8	24
25-JUL-90	****	****	****	**	*****	*****	*****	**	921.0	1291.4	2311.1	24
26-JUL-90	****	****	****	**	*****	*****	*****	**	1438.1	1928.5	2243.9	24
27-JUL-90	****	****	****	**	*****	*****	*****	**	1418.3	1770.0	2032.0	24
28-JUL-90	****	****	****	**	*****	*****	*****	**	1674.7	1989.5	2043.1	24
29-JUL-90	****	****	****	**	*****	*****	*****	**	1826.8	1943.5	2021.1	24
30-JUL-90	****	****	****	**	*****	*****	*****	**	1170.1	1578.8	1831.8	24
31-JUL-90	****	****	****	**	*****	*****	*****	**	913.5	1008.9	1209.2	24
GRAND MONTHLY MEAN	6.9	7.1	7.3		85.2	88.6	91.4		1045.9	1196.9	1398.6	

\# A day with less than 24 values.

**** No data values for that day.

@ A value for dissolved oxygen is approaching the objective. (5.0 mg/l or 60% saturation)

? Daily mean flow is below 750 cf/s.

Calibration Certification: Thomas Springer Date: Sept 12/1990

SUMMARY OF DAILY ANON VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-AUG-90 to 31-AUG-90

07-Jan-91 ENVIRONMENT CANADA WATER QUALITY BRANCH - MONCTON

DAY	TEMPERATURE C				pH units				SPECIFIC CONDUCTANCE us/cm			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-AUG-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
2-AUG-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
3-AUG-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
4-AUG-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
5-AUG-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
6-AUG-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
7-AUG-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
8-AUG-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
9-AUG-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
10-AUG-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
11-AUG-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
12-AUG-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
13-AUG-90	25.6	26.2	26.6	7	6.8	6.9	6.9	7	77.0	77.0	77.0	7
14-AUG-90	24.2	25.1	26.6	24	6.8	6.8	6.9	24	77.0	80.0	84.0	24
15-AUG-90	23.4	24.3	25.5	24	6.7	6.8	6.9	24	73.0	74.6	77.0	24
16-AUG-90	23.9	24.9	26.0	24	6.7	6.8	6.9	24	73.0	73.1	74.0	24
17-AUG-90	24.0	25.0	26.0	24	6.7	6.8	6.9	24	72.0	73.9	78.0	24
18-AUG-90	24.3	25.3	26.1	24	6.8	6.8	6.9	24	74.0	79.0	86.0	24
19-AUG-90	23.9	24.9	26.2	24	6.8	6.9	7.0	24	85.0	90.2	98.0	24
20-AUG-90	22.7	23.5	24.3	24	6.9	6.9	7.0	24	88.0	91.4	95.0	24
21-AUG-90	22.7	23.5	24.1	24	6.9	6.9	7.0	24	89.0	92.0	94.0	24
22-AUG-90	22.3	23.4	24.2	24	6.8	6.9	7.0	24	84.0	87.6	93.0	24
23-AUG-90	22.3	23.3	24.3	24	6.8	6.9	7.0	24	81.0	83.2	84.0	24
24-AUG-90	23.0	23.7	24.6	24	6.8	6.9	7.0	24	83.0	88.1	93.0	24
25-AUG-90	23.1	24.0	24.9	24	6.8	6.9	7.0	24	90.0	92.0	94.0	24
26-AUG-90	23.5	24.1	25.1	24	6.8	6.9	6.9	24	92.0	93.9	96.0	24
27-AUG-90	24.6	25.2	25.6	24	6.8	6.9	7.0	24	95.0	97.0	99.0	24
28-AUG-90	23.8	24.5	25.5	24	6.7	6.8	6.9	24	75.0	77.0	89.0	23
29-AUG-90	23.8	24.4	24.9	14	6.7	6.8	6.8	14	76.0	80.1	84.0	14
30-AUG-90	23.6	24.3	25.0	16	6.6	6.7	6.7	16	72.0	74.1	77.0	16
31-AUG-90	23.3	24.3	25.1	24	6.7	6.8	6.8	24	77.0	85.3	92.0	24
GRAND MONTHLY MEAN	23.6	24.4	25.3		6.8	6.8	6.9		80.7	83.7	87.6	

* A day with less than 24 values.

**** No data values for that day.

SUMMARY OF DAILY AKGM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-AUG-90 to 31-AUG-90

DAY	DISSOLVED OXYGEN mg/l				DISSOLVED OXYGEN % saturation				FLOW cf/s			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-AUG-90	****	****	****	**	*****	*****	*****	**	928.5	1014.3	1350.7	24
2-AUG-90	****	****	****	**	*****	*****	*****	**	1113.3	1263.8	1462.6	24
3-AUG-90	****	****	****	**	*****	*****	*****	**	1115.3	1116.9	1123.4	24
4-AUG-90	****	****	****	**	*****	*****	*****	**	1123.4	1591.0	1786.7	24
5-AUG-90	****	****	****	**	*****	*****	*****	**	1752.1	1831.1	1977.7	24
6-AUG-90	****	****	****	**	*****	*****	*****	**	1451.5	1590.8	1784.2	24
7-AUG-90	****	****	****	**	*****	*****	*****	**	1521.1	1667.1	1708.3	24
8-AUG-90	****	****	****	**	*****	*****	*****	**	1129.4	1393.5	1705.9	24
9-AUG-90	****	****	****	**	*****	*****	*****	**	1548.5	1611.5	1713.1	24
10-AUG-90	****	****	****	**	*****	*****	*****	**	1713.1	1716.6	1722.8	24
11-AUG-90	****	****	****	**	*****	*****	*****	**	1471.5	1642.5	1732.6	24
12-AUG-90	****	****	****	**	*****	*****	*****	**	1555.3	2257.0	2833.9	24
13-AUG-90	6.7	7.0	7.1	7	87.5	92.2	94.6	7	2162.3	2665.4	2833.9	24
14-AUG-90	6.3	6.6	7.1	24	80.1	85.8	94.6	24	2037.5	2623.8	2876.5	24
15-AUG-90	6.4	6.8	7.3	24	80.2	86.2	95.6	24	2862.3	2874.7	2876.5	24
16-AUG-90	6.4	6.8	7.3	24	81.3	88.0	95.5	24	2862.3	2870.7	2876.5	24
17-AUG-90	6.5	6.8	7.3	24	81.6	88.1	95.7	24	2240.9	2563.2	2858.7	24
18-AUG-90	6.5	6.8	7.3	24	82.4	88.2	95.9	24	1496.2	2016.6	2485.0	24
19-AUG-90	6.6	6.9	7.4	24	83.8	89.1	94.1	24	1424.9	1738.7	2002.0	24
20-AUG-90	6.8	7.2	7.5	24	83.8	89.6	95.4	24	1732.6	1748.6	1752.1	24
21-AUG-90	6.9	7.2	7.6	24	85.2	90.6	96.5	24	1749.7	1796.5	2068.1	24
22-AUG-90	6.8	7.3	7.7	24	83.5	90.5	97.1	24	2065.3	2081.3	2087.7	24
23-AUG-90	6.9	7.2	7.7	24	83.7	90.2	97.3	24	1735.0	1969.5	2084.9	24
24-AUG-90	6.9	7.2	7.7	24	85.1	90.8	97.1	24	1732.6	1735.6	1742.3	24
25-AUG-90	6.8	7.1	7.6	24	84.3	90.1	97.7	24	1732.6	1732.6	1732.6	24
26-AUG-90	6.7	7.1	7.5	24	84.0	89.3	95.0	24	1636.7	1661.9	1735.0	24
27-AUG-90	6.5	6.9	7.4	24	83.5	89.9	96.9	24	1636.7	2122.8	2876.5	24
28-AUG-90	6.4	6.8	7.2	24	81.1	86.7	94.3	24	1747.2	2493.2	2862.3	24
29-AUG-90	6.5	6.8	7.3	14	81.3	87.0	93.4	14	2547.1	2816.9	2855.2	16
30-AUG-90	6.4	6.7	7.1	16	79.9	84.8	91.4	16	1625.0	1699.6	2062.5	8
31-AUG-90	6.5	6.9	7.4	24	80.9	87.6	95.7	24	1771.8	2247.3	2596.8	24
GRAND MONTHLY MEAN	6.6	7.0	7.4		82.8	88.7	95.5		1716.8	1940.5	2134.4	

8 A day with less than 24 values.

**** No data values for that day.

8 A value for dissolved oxygen is approaching the objective. (5.0 mg/l or 60% saturation)

? Daily mean flow is below 750 cf/s.

Calibration Certification: Thomas A Springer Date: Jan 7, 1991

SUMMARY OF DAILY AMON VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-SEP-90 to 30-SEP-90

DAY	TEMPERATURE C				pH units				SPECIFIC CONDUCTANCE us/cm			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-SEP-90	23.5	24.5	25.2	24	6.7	6.8	6.9	24	79.0	82.3	85.0	24
2-SEP-90	23.2	24.0	25.1	24	6.7	6.7	6.8	24	78.0	81.1	85.0	24
3-SEP-90	22.7	23.4	24.2	24	6.7	6.7	6.8	24	81.0	82.6	84.0	24
4-SEP-90	21.3	22.4	23.5	24	6.7	6.8	6.8	24	83.0	85.2	87.0	24
5-SEP-90	21.0	21.8	23.1	24	6.7	6.7	6.8	24	82.0	83.8	85.0	24
6-SEP-90	20.9	21.6	22.6	24	6.7	6.7	6.8	24	73.0	76.6	84.0	24
7-SEP-90	21.0	21.4	22.5	24	6.6	6.7	6.8	24	71.0	72.3	73.0	24
8-SEP-90	18.9	19.9	20.9	24	6.6	6.7	6.8	24	72.0	75.8	79.0	24
9-SEP-90	18.5	19.5	20.4	24	6.7	6.7	6.8	24	78.0	80.7	84.0	24
10-SEP-90	18.7	19.3	20.3	24	6.7	6.8	6.8	24	80.0	82.3	84.0	24
11-SEP-90	18.8	19.2	20.1	24	6.8	6.8	6.9	24	80.0	81.6	84.0	24
12-SEP-90	18.5	19.1	20.1	24	6.8	6.8	6.9	24	81.0	84.6	90.0	24
13-SEP-90	18.7	19.2	20.0	24	6.8	6.8	6.9	24	81.0	84.1	89.0	24
14-SEP-90	18.3	19.0	20.0	24	6.8	6.8	6.9	24	73.0	80.7	88.0	24
15-SEP-90	18.5	18.7	18.9	24	6.8	6.8	6.8	24	70.0	71.5	73.0	24
16-SEP-90	17.7	18.4	19.1	24	6.7	6.8	6.8	24	69.0	71.4	73.0	24
17-SEP-90	17.6	18.1	19.0	24	6.7	6.8	6.8	24	65.0	67.3	70.0	24
18-SEP-90	16.6	17.1	18.0	24	6.8	6.8	6.8	24	65.0	68.4	71.0	24
19-SEP-90	15.9	16.6	17.4	24	6.8	6.8	6.9	24	70.0	76.7	87.0	24
20-SEP-90	15.7	16.4	17.4	24	6.9	6.9	6.9	24	85.0	88.1	92.0	24
21-SEP-90	15.0	15.6	16.3	24	6.8	6.9	6.9	24	84.0	85.9	90.0	24
22-SEP-90	15.0	15.5	16.6	24	6.8	6.8	6.9	24	84.0	88.5	98.0	24
23-SEP-90	15.0	15.4	15.9	24	6.9	6.9	6.9	24	99.0	102.2	105.0	24
24-SEP-90	14.7	15.3	15.9	24	6.8	6.8	6.9	24	94.0	96.2	99.0	24
25-SEP-90	14.4	15.1	15.8	24	6.7	6.7	6.8	24	65.0	74.0	94.0	24
26-SEP-90	14.8	15.3	15.9	24	6.6	6.6	6.7	24	47.0	53.4	67.0	24
27-SEP-90	15.1	15.5	15.9	24	6.6	6.6	6.6	24	45.0	46.0	48.0	24
28-SEP-90	15.5	15.9	16.5	24	6.6	6.6	6.6	24	47.0	48.8	50.0	24
29-SEP-90	15.7	16.1	16.7	24	6.6	6.6	6.7	24	46.0	46.8	48.0	24
30-SEP-90	15.3	15.5	15.8	24	6.6	6.7	6.7	24	47.0	59.8	73.0	24
GRAND MONTHLY MEAN	17.9	18.5	19.3		6.7	6.8	6.8		72.5	76.0	80.6	

@ A day with less than 24 values.

**** No data values for that day.

SUMMARY OF DAILY ANQN VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-SEP-90 to 30-SEP-90

DAY	DISSOLVED OXYGEN mg/l				DISSOLVED OXYGEN % saturation				FLOW cf/s			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-SEP-90	6.6	6.9	7.4	24	82.7	88.6	95.9	24	2023.8	2289.8	2430.4	24
2-SEP-90	6.6	7.0	7.4	24	82.4	87.9	95.9	24	2110.4	2271.8	2417.6	24
3-SEP-90	6.7	7.1	7.7	24	83.0	88.3	95.9	24	2156.5	2233.3	2342.1	24
4-SEP-90	7.2	7.4	7.8	24	85.5	91.0	96.2	24	2156.5	2216.9	2317.3	24
5-SEP-90	7.1	7.4	7.9	24	84.0	89.2	97.6	24	2171.1	2490.7	2876.5	24
6-SEP-90	7.2	7.4	7.8	24	85.2	89.3	95.8	24	2876.5	3067.5	3144.8	24
7-SEP-90	7.2	7.4	7.8	24	85.6	89.2	95.6	24	3110.9	3141.6	3198.1	24
8-SEP-90	7.5	7.7	8.1	24	85.5	89.1	95.3	24	2736.0	2761.8	2963.0	24
9-SEP-90	7.7	8.0	8.2	24	87.0	91.7	95.3	24	2547.1	2677.7	2763.8	24
10-SEP-90	7.7	7.8	8.2	24	86.5	89.6	95.3	24	2547.1	2645.1	2781.2	24
11-SEP-90	7.6	7.7	8.0	24	85.7	88.3	92.9	24	2520.9	2637.4	2777.7	24
12-SEP-90	7.6	7.8	8.0	24	85.4	88.8	92.9	24	2194.6	2412.4	2756.8	24
13-SEP-90	7.6	7.8	7.9	24	85.9	88.5	92.0	24	2168.1	2401.0	2753.4	24
14-SEP-90	7.8	7.9	8.0	24	87.6	90.1	93.1	24	2708.5	3090.4	3294.6	24
15-SEP-90	7.8	8.0	8.2	24	88.2	90.0	92.2	24	3103.4	3231.2	3325.9	24
16-SEP-90	7.8	7.9	8.1	24	85.7	88.6	91.9	24	3341.6	3361.2	3400.9	24
17-SEP-90	7.8	7.9	8.2	24	85.7	88.6	91.7	24	3310.2	3320.0	3341.6	24
18-SEP-90	7.9	8.0	8.2	24	85.0	87.5	91.0	24	2999.6	3245.9	3310.2	24
19-SEP-90	7.8	8.0	8.2	24	82.8	86.1	89.2	24	2101.9	2323.8	2952.1	24
20-SEP-90	7.8	7.9	8.1	24	82.6	85.1	89.1	24	2076.5	2321.4	2781.2	24
21-SEP-90	7.8	8.0	8.2	24	81.4	84.1	87.6	24	2280.4	2509.3	2664.1	24
22-SEP-90	7.8	7.9	8.2	24	80.6	83.3	87.8	24	1589.9	1873.7	2417.6	24
23-SEP-90	7.9	8.0	8.0	24	82.3	83.3	84.7	24	1829.3	2053.0	2537.2	24
24-SEP-90	7.8	7.9	8.0	24	80.4	82.3	84.7	24	1924.6	2100.7	2534.0	24
25-SEP-90	7.8	7.9	8.0	24	80.0	82.4	84.7	24	1424.9	1768.0	2110.4	24
26-SEP-90	7.8	8.0	8.1	24	80.9	83.4	86.1	24	1389.8	1705.2	2007.4	24
27-SEP-90	7.8	7.9	8.0	24	81.0	83.0	84.8	24	1280.3	1573.2	1693.8	24
28-SEP-90	7.7	7.8	8.0	24	80.9	82.5	84.5	24	1280.3	1552.8	1836.9	24
29-SEP-90	7.5	7.7	7.8	24	78.9	81.7	83.9	24	1527.9	1784.1	1903.7	24
30-SEP-90	7.4	7.6	7.7	24	77.3	79.3	81.3	24	1854.7	2274.9	2880.1	24
GRAND MONTHLY MEAN	7.5	7.7	8.0		83.5	86.7	90.8		2244.8	2444.5	2683.8	

@ A day with less than 24 values.

**** No data values for that day.

@ A value for dissolved oxygen is approaching the objective.
(5.0 mg/l or 60% saturation)

? Daily mean flow is below 750 cf/s.

Calibration Certification: Thomas A Springer Date: Jan. 7, 1991

SUMMARY OF DAILY AMQM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-OCT-90 to 31-OCT-90

DAY	DISSOLVED OXYGEN mg/l				DISSOLVED OXYGEN % saturation				FLOW cf/s			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-OCT-90	7.4	7.9	8.9	24	77.3	82.8	94.8	24	2068.1	2601.7	2848.1	24
2-OCT-90	8.7	8.8	8.9	24	89.2	91.3	94.6	24	2054.1	2701.9	3310.2	24
3-OCT-90	8.8	9.0	9.3	24	89.1	92.3	95.6	24	2919.6	3219.1	3357.3	24
4-OCT-90	9.1	9.2	9.4	24	90.4	93.0	96.4	24	2168.1	3231.6	3341.6	24
5-OCT-90	9.0	9.2	9.3	24	91.1	94.0	95.7	24	2073.7	2712.7	3084.7	24
6-OCT-90	9.1	9.2	9.3	24	90.7	93.2	97.0	24	2643.8	3072.0	3322.0	24
7-OCT-90	9.0	9.1	9.2	24	92.0	94.4	97.5	24	2623.6	2981.0	3084.7	24
8-OCT-90	8.9	9.1	9.2	24	91.9	94.0	97.5	24	2537.2	2933.0	3318.0	24
9-OCT-90	8.8	8.9	9.0	24	88.7	90.6	92.7	24	1742.3	2144.1	2547.1	24
10-OCT-90	8.8	8.8	9.1	24	88.2	89.0	91.1	24	1744.8	2320.3	2481.8	24
11-OCT-90	9.0	9.0	9.1	24	89.1	89.9	91.1	24	2179.9	2259.5	2404.9	24
12-OCT-90	8.8	8.9	9.1	24	88.8	90.3	92.2	24	2168.1	2308.7	2404.9	24
13-OCT-90	8.7	8.9	9.0	17	89.6	91.0	92.4	17	2168.1	2236.9	2395.4	24
14-OCT-90	****	****	****	**	*****	*****	*****	**	2207.8	2213.7	2231.8	24
15-OCT-90	****	****	****	**	*****	*****	*****	**	2110.4	2331.3	2788.2	24
16-OCT-90	****	****	****	**	*****	*****	*****	**	1589.9	1919.0	2121.8	24
17-OCT-90	****	****	****	**	*****	*****	*****	**	1681.8	2133.8	2231.8	24
18-OCT-90	8.4	8.7	8.7	9	85.0	87.9	88.8	9	1801.7	2007.2	2156.5	24
19-OCT-90	8.7	8.8	9.0	24	89.1	90.3	91.3	24	1908.9	2197.5	2491.5	24
20-OCT-90	9.1	9.4	9.6	24	88.8	90.7	92.7	24	2304.9	2428.5	2481.8	24
21-OCT-90	9.6	9.6	9.8	24	89.0	91.3	93.8	24	2099.0	2386.5	2456.0	24
22-OCT-90	9.5	9.7	9.8	24	90.4	92.5	93.9	24	2054.1	2394.5	3341.6	24
23-OCT-90	9.6	9.7	9.8	24	91.9	93.0	94.8	24	2941.2	3249.0	3357.3	24
24-OCT-90	9.8	9.9	10.0	23	92.2	93.4	95.5	23	3156.2	3376.7	3873.6	24
25-OCT-90	9.6	9.8	9.9	24	89.5	91.7	94.1	24	3766.6	3846.7	3938.7	24
26-OCT-90	9.7	9.8	10.1	24	88.3	90.4	93.1	24	3310.2	3536.2	3766.6	24
27-OCT-90	10.0	10.2	10.5	24	89.1	91.5	94.5	24	3092.2	3352.5	3653.2	24
28-OCT-90	10.3	10.5	10.7	24	89.9	91.7	94.3	24	3036.4	3313.9	3558.3	24
29-OCT-90	10.5	10.6	10.8	24	92.2	93.5	94.7	24	2937.6	3409.0	3599.3	24
30-OCT-90	10.7	10.9	11.1	24	92.4	94.3	96.7	24	3373.1	3420.1	3574.7	24
31-OCT-90	11.0	11.1	11.3	24	93.2	94.9	96.5	24	2534.0	2964.7	3329.8	24
GRAND MONTHLY MEAN	9.3	9.4	9.6		89.5	91.6	94.2		2419.3	2748.5	2995.3	

* A day with less than 24 values.

**** No data values for that day.

a A value for dissolved oxygen is approaching the objective. (5.0 mg/l or 60% saturation)

? Daily mean flow is below 750 cf/s.

Calibration Certification: Thomas A Springer Date: Jan 31 91

SUMMARY OF DAILY AMGM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-OCT-90 to 31-OCT-90

DAY	TEMPERATURE C				units				SPECIFIC CONDUCTANCE us/cm			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-OCT-90	15.2	15.5	16.0	24	6.7	6.8	6.9	24	64.0	67.0	71.0	24
2-OCT-90	14.3	14.9	15.9	24	6.9	6.9	6.9	24	71.0	77.8	82.0	24
3-OCT-90	13.6	14.3	15.0	24	6.8	6.9	7.0	24	62.0	70.1	75.0	24
4-OCT-90	13.3	14.0	14.7	24	6.9	6.9	6.9	24	72.0	72.6	73.0	24
5-OCT-90	14.0	14.5	14.7	24	6.9	6.9	7.0	24	69.0	75.9	81.0	24
6-OCT-90	13.3	14.1	15.2	24	6.9	6.9	7.0	24	72.0	75.3	78.0	24
7-OCT-90	14.3	15.0	15.8	24	6.9	6.9	6.9	24	69.0	71.6	73.0	24
8-OCT-90	14.6	14.9	15.8	24	6.8	6.9	6.9	24	67.0	69.8	72.0	24
9-OCT-90	13.9	14.1	14.5	24	6.8	6.8	6.9	24	72.0	75.2	79.0	24
10-OCT-90	13.6	13.8	14.0	24	6.8	6.9	6.9	24	80.0	86.0	92.0	24
11-OCT-90	13.1	13.3	13.6	24	6.9	6.9	6.9	24	80.1	82.9	86.2	24
12-OCT-90	13.5	13.9	14.5	24	6.9	6.9	6.9	24	81.4	83.7	86.3	24
13-OCT-90	14.3	14.5	14.7	17	6.9	6.9	6.9	17	80.4	81.8	83.5	17
14-OCT-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
15-OCT-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
16-OCT-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
17-OCT-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
18-OCT-90	13.8	14.0	14.2	9	6.8	6.9	6.9	9	86.4	87.9	91.4	9
19-OCT-90	13.7	14.4	14.7	24	6.9	6.9	7.0	24	81.6	85.0	87.5	24
20-OCT-90	11.0	11.8	13.5	24	7.0	7.0	7.0	24	78.8	82.0	85.6	24
21-OCT-90	10.4	11.1	11.8	24	6.9	6.9	7.0	24	78.8	79.2	79.9	24
22-OCT-90	11.1	11.5	12.2	24	6.9	6.9	7.0	24	78.0	82.6	88.1	24
23-OCT-90	11.1	11.6	12.2	24	6.9	6.9	7.0	24	70.3	73.9	86.2	24
24-OCT-90	10.7	11.1	11.6	23	6.8	6.8	6.9	23	69.4	70.5	71.4	23
25-OCT-90	10.2	10.7	11.4	24	6.7	6.7	6.8	24	64.6	66.8	70.5	24
26-OCT-90	9.5	9.9	10.7	24	6.6	6.7	6.7	24	63.7	65.0	66.8	24
27-OCT-90	8.4	8.9	9.5	24	6.7	6.7	6.8	24	64.9	66.8	69.0	24
28-OCT-90	7.4	7.9	8.6	24	6.7	6.7	6.7	24	67.0	70.0	72.1	24
29-OCT-90	7.8	8.0	8.2	24	6.7	6.7	6.8	24	68.3	70.3	72.3	24
30-OCT-90	6.9	7.4	7.7	24	6.7	6.8	6.8	24	68.4	69.7	70.5	24
31-OCT-90	6.5	6.9	7.6	24	6.7	6.7	6.8	24	70.5	71.7	72.7	24
GRAND MONTHLY MEAN	11.8	12.3	12.9		6.8	6.8	6.9		72.2	75.2	78.4	

\# A day with less than 24 values.

**** No data values for that day.

SUMMARY OF DAILY AMGM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-NOV-90 to 30-NOV-90

DAY	TEMPERATURE C				pH units				SPECIFIC CONDUCTANCE us/cm			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-NOV-90	5.4	6.0	6.8	24	6.7	6.8	6.8	24	72.6	76.4	78.8	24
2-NOV-90	0.0	4.9	6.2	24	6.8	6.8	6.8	24	74.0	76.8	78.9	24
3-NOV-90	0.0	5.9	6.5	24	6.7	6.8	6.8	24	74.0	74.9	76.0	24
4-NOV-90	0.0	6.6	7.5	24	6.7	6.8	6.8	24	76.0	77.5	79.0	24
5-NOV-90	0.0	7.0	7.6	24	6.8	6.8	6.8	24	78.0	79.0	82.0	24
6-NOV-90	0.0	6.3	6.9	24	6.8	6.8	6.9	24	78.0	80.3	82.0	24
7-NOV-90	0.0	5.7	6.0	24	6.8	6.8	6.9	24	73.0	76.4	79.0	24
8-NOV-90	0.0	5.2	5.5	23	6.8	6.8	6.9	23	69.0	75.2	85.0	23
9-NOV-90	0.0	3.7	4.8	19	6.9	6.9	6.9	19	78.0	79.2	84.0	19
10-NOV-90	0.0	3.9	4.3	21	6.9	6.9	6.9	21	79.0	79.4	80.0	21
11-NOV-90	0.0	5.0	5.4	20	6.9	6.9	6.9	20	74.0	78.7	83.0	20
12-NOV-90	****	****	****	**	****	****	****	**	*******	*******	*******	**
13-NOV-90	0.0	1.9	2.1	10	6.9	6.9	7.0	10	64.0	66.3	68.0	10
14-NOV-90	0.0	1.8	2.2	24	6.9	6.9	6.9	24	64.0	65.0	67.0	24
15-NOV-90	0.0	1.8	2.3	24	6.9	6.9	6.9	24	66.0	68.1	69.0	24
16-NOV-90	0.0	2.0	2.4	24	6.8	6.9	6.9	24	69.0	69.8	70.0	24
17-NOV-90	0.0	2.3	2.8	24	6.8	6.8	6.9	24	70.0	70.8	72.0	24
18-NOV-90	0.0	2.6	2.9	24	6.8	6.8	6.9	24	72.0	78.8	82.0	24
19-NOV-90	0.0	1.5	2.3	24	6.9	6.9	6.9	24	81.0	81.3	82.0	24
20-NOV-90	0.0	1.4	1.9	24	6.9	6.9	6.9	24	81.0	82.5	84.0	24
21-NOV-90	0.0	1.6	1.9	24	6.9	6.9	6.9	24	83.0	83.9	85.0	24
22-NOV-90	0.0	1.5	1.8	24	6.9	6.9	6.9	24	79.0	81.4	84.0	24
23-NOV-90	0.0	1.9	2.0	24	6.9	6.9	6.9	24	80.0	81.3	82.0	24
24-NOV-90	0.0	2.3	2.6	24	6.9	6.9	6.9	24	81.0	82.4	84.0	24
25-NOV-90	0.0	2.3	2.7	24	6.8	6.9	6.9	24	77.0	80.0	83.0	24
26-NOV-90	0.0	2.1	2.7	24	6.9	6.9	6.9	24	77.0	78.0	79.0	24
27-NOV-90	0.0	1.3	1.8	24	6.9	6.9	6.9	24	73.0	76.1	79.0	24
28-NOV-90	0.0	2.4	3.3	24	6.9	6.9	6.9	24	74.0	76.2	78.0	24
29-NOV-90	0.0	3.2	3.4	24	6.8	6.9	6.9	24	67.0	73.2	82.0	24
30-NOV-90	2.3	2.7	3.3	24	6.8	6.9	6.9	24	68.0	73.9	79.0	24
GRAND MONTHLY MEAN	0.3	3.3	3.9		6.8	6.9	6.9		74.2	76.6	79.2	

0 A day with less than 24 values.

**** No data values for that day.

SUMMARY OF DAILY AMGM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-NOV-90 to 30-NOV-90

DAY	DISSOLVED OXYGEN mg/l				DISSOLVED OXYGEN % saturation				FLOW cf/s			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-NOV-90	11.3	11.5	11.7	24	93.7	95.5	98.2	24	2534.0	2574.9	2613.6	24
2-NOV-90	11.6	11.6	11.7	24	82.6	94.3	98.2	24	2616.9	2681.9	2777.7	24
3-NOV-90	11.4	11.5	11.6	24	94.0	95.0	95.9	24	2156.5	2531.0	2640.5	24
4-NOV-90	11.3	11.4	11.4	*24	94.1	96.0	98.5	24	2456.0	2505.7	2547.1	24
5-NOV-90	11.2	11.3	11.4	24	94.5	96.3	98.5	24	2231.8	2393.6	2456.0	24
6-NOV-90	11.2	11.3	11.5	24	93.3	94.8	96.9	24	2379.7	2465.4	2586.8	24
7-NOV-90	11.3	11.5	11.7	24	93.1	94.8	96.4	24	2596.8	2884.3	3205.7	24
8-NOV-90	11.3	11.5	11.7	23	91.7	93.7	95.9	23	1872.6	2143.5	2517.6	24
9-NOV-90	11.8	12.0	12.2	19	91.7	94.1	96.1	19	2268.2	2284.6	2301.9	24
10-NOV-90	12.1	12.1	12.2	21	94.3	95.3	96.1	21	2207.8	2247.6	2268.2	24
11-NOV-90	11.6	11.9	12.1	20	94.6	96.1	97.1	20	2207.8	3243.4	5088.2	24
12-NOV-90	****	****	****	**	*****	*****	*****	**	3424.8	4795.7	5078.0	24
13-NOV-90	12.7	12.8	12.9	10	93.7	95.2	96.5	10	3217.2	3314.6	3357.3	24
14-NOV-90	12.8	13.0	13.1	24	95.2	96.3	98.3	24	3310.2	3340.1	3357.3	24
15-NOV-90	12.9	13.0	13.1	24	95.0	96.5	98.6	24	3248.0	3279.9	3310.2	24
16-NOV-90	13.0	13.0	13.0	24	96.2	97.1	98.1	24	3232.6	3237.9	3248.0	24
17-NOV-90	12.8	12.9	13.0	24	95.5	96.7	98.1	24	2304.9	2807.3	3217.2	24
18-NOV-90	12.6	12.7	12.7	24	95.6	96.2	97.1	24	2304.9	2306.1	2317.3	24
19-NOV-90	12.7	12.8	12.8	24	92.4	94.0	95.8	24	2256.0	2285.5	2308.0	24
20-NOV-90	12.8	12.9	12.9	24	92.7	94.3	96.0	24	2280.4	2293.1	2304.9	24
21-NOV-90	12.8	12.9	13.0	24	94.0	95.3	96.2	24	2280.4	2291.1	2292.6	24
22-NOV-90	12.9	13.0	13.0	24	94.4	95.7	96.5	24	2268.2	2279.8	2280.4	24
23-NOV-90	12.8	12.9	13.0	24	95.0	95.8	96.7	24	2271.2	2279.2	2280.4	24
24-NOV-90	12.5	12.7	12.8	24	94.5	95.3	96.0	24	2277.3	2291.4	2304.9	24
25-NOV-90	12.4	12.5	12.6	24	92.5	94.3	95.6	24	2304.9	2308.5	2329.7	24
26-NOV-90	12.6	12.7	12.9	24	93.5	95.1	96.0	24	2286.5	2323.0	2332.8	24
27-NOV-90	12.8	12.9	13.1	24	93.2	94.8	97.2	24	2243.9	2264.6	2280.4	24
28-NOV-90	12.7	12.9	13.0	24	95.8	97.0	99.0	24	2243.9	2254.5	2274.3	24
29-NOV-90	12.5	12.7	12.7	24	96.6	97.6	98.2	24	2259.0	2894.1	3310.2	24
30-NOV-90	12.3	12.5	12.6	24	93.3	94.9	96.6	24	2032.0	2193.8	2684.6	24
GRAND MONTHLY MEAN	12.2	12.4	12.5		93.7	95.4	97.0		2452.5	2633.2	2795.7	

\# A day with less than 24 values.

**** No data values for that day.

@ A value for dissolved oxygen is approaching the objective. (5.0 mg/l or 60% saturation)

? Daily mean flow is below 750 cf/s.

Calibration Certification: H. Spranger Date: Jan 31/91

SUMMARY OF DAILY AMGN VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-DEC-90 to 31-DEC-90

DAY	TEMPERATURE C				pH units				SPECIFIC CONDUCTANCE us/cm			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-DEC-90	1.4	1.9	2.4	24	6.8	6.9	6.9	24	49.0	62.8	82.0	24
2-DEC-90	1.9	2.3	2.7	24	6.8	6.9	6.9	24	49.0	69.8	82.0	24
3-DEC-90	1.3	1.8	2.7	24	6.9	6.9	7.0	24	77.0	82.8	92.0	24
4-DEC-90	1.0	1.3	1.6	24	7.0	7.0	7.0	24	85.0	91.8	94.0	24
5-DEC-90	1.8	2.6	3.0	24	6.8	6.8	7.0	24	62.0	73.5	87.0	24
6-DEC-90	0.9	1.3	2.3	24	6.7	6.8	6.8	24	57.0	59.0	62.0	24
7-DEC-90	1.0	1.2	1.4	24	6.7	6.8	6.8	24	57.0	59.3	61.0	24
8-DEC-90	1.2	1.3	1.4	24	6.8	6.8	6.8	24	61.0	62.1	63.0	24
9-DEC-90	1.0	1.2	1.4	24	6.8	6.8	6.8	24	61.0	61.5	63.0	24
10-DEC-90	0.6	0.9	1.4	24	6.8	6.8	6.8	24	60.0	60.5	61.0	24
11-DEC-90	0.1	0.3	1.3	24	6.8	6.8	6.9	24	59.0	61.7	66.0	24
12-DEC-90	0.1	0.1	0.3	24	6.7	6.8	6.9	24	57.0	66.5	94.0	24
13-DEC-90	0.2	0.2	0.3	24	6.7	6.7	6.9	24	58.0	63.8	77.0	24
14-DEC-90	0.1	0.2	0.3	24	6.7	6.8	6.8	24	67.0	71.0	76.0	24
15-DEC-90	0.1	0.2	0.3	24	6.8	6.8	6.8	24	71.0	73.0	77.0	24
16-DEC-90	0.2	0.3	0.4	24	6.8	6.8	6.8	24	74.0	74.4	75.0	24
17-DEC-90	0.4	0.5	0.7	24	6.8	6.8	6.8	24	72.0	75.4	77.0	24
18-DEC-90	0.4	0.6	1.1	24	6.7	6.7	6.8	24	67.0	70.0	73.0	24
19-DEC-90	1.0	1.2	1.3	22	6.7	6.7	6.8	22	63.1	68.1	71.0	22
20-DEC-90	0.0	0.3	0.9	24	6.6	6.7	6.7	24	55.2	56.9	61.1	24
21-DEC-90	0.0	0.2	0.5	24	6.6	6.6	6.6	24	54.2	55.0	55.4	24
22-DEC-90	0.0	1.0	1.3	24	6.6	6.6	6.7	24	54.4	56.9	61.5	24
23-DEC-90	0.0	1.3	2.0	24	6.6	6.6	6.7	24	55.6	57.2	60.5	24
24-DEC-90	0.0	1.6	2.0	24	6.6	6.6	6.7	24	42.8	51.6	55.7	24
25-DEC-90	0.0	0.5	1.2	24	6.6	6.6	6.6	24	39.9	40.8	42.9	24
26-DEC-90	0.0	0.3	0.5	24	6.5	6.5	6.6	24	37.1	38.0	39.0	24
27-DEC-90	0.0	0.0	0.2	24	6.4	6.4	6.5	24	36.2	37.0	37.3	24
28-DEC-90	0.0	0.0	0.1	24	6.4	6.4	6.4	24	37.3	37.9	38.5	24
29-DEC-90	0.0	0.3	0.6	24	6.4	6.4	6.5	24	39.5	42.6	43.6	24
30-DEC-90	0.0	0.7	0.8	24	6.5	6.5	6.5	24	44.6	47.6	48.8	24
31-DEC-90	0.1	0.4	0.8	24	6.5	6.5	6.6	24	47.9	48.7	48.9	24
GRAND MONTHLY MEAN	0.5	0.8	1.2		6.7	6.7	6.8		56.5	60.6	65.4	

@ A day with less than 24 values.

**** No data values for that day.

SUMMARY OF DAILY ANOM VALUES FOR THE ST. CROIX RIVER AT MILLTOWN

Period from 01-DEC-90 to 31-DEC-90

11-Mar-91 ENVIRONMENT CANADA WATER QUALITY BRANCH - MONCTON

DAY	DISSOLVED OXYGEN mg/l				DISSOLVED OXYGEN % saturation				FLOW cf/s			
	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS	MIN.	MEAN	MAX.	HRS
1-DEC-90	12.7	12.8	13.0	24	94.1	95.7	97.7	24	2468.9	2678.1	2876.5	24
2-DEC-90	12.7	12.8	13.0	24	95.0	96.6	98.3	24	2026.5	2577.8	2992.2	24
3-DEC-90	12.7	12.8	12.9	24	93.2	95.0	97.6	24	1708.3	1843.5	2029.3	24
4-DEC-90	12.9	13.0	13.1	24	94.4	95.3	96.7	24	1776.8	1977.1	2553.7	24
5-DEC-90	12.6	12.7	13.0	24	95.6	96.8	98.4	24	2774.2	3875.6	4115.6	24
6-DEC-90	12.6	12.7	12.8	24	92.3	93.5	95.9	24	3599.3	3704.3	3834.9	24
7-DEC-90	12.8	12.8	12.9	24	93.3	93.9	95.1	24	3393.0	3512.3	3599.3	24
8-DEC-90	12.9	12.9	12.9	24	94.5	94.7	95.1	24	3420.8	3431.6	3468.9	24
9-DEC-90	12.8	12.9	13.0	24	93.3	94.4	95.6	24	3404.9	3419.7	3436.8	24
10-DEC-90	12.9	12.9	13.0	24	93.1	94.0	95.6	24	3373.1	3388.5	3420.8	24
11-DEC-90	12.9	13.1	13.3	24	92.5	93.8	94.9	24	2104.7	3170.9	3473.0	24
12-DEC-90	13.1	13.3	13.6	24	93.2	94.7	96.8	24	1227.8	2061.4	4008.9	24
13-DEC-90	12.8	13.1	13.6	24	91.7	93.8	97.1	24	1945.7	2094.1	2357.0	24
14-DEC-90	12.7	12.9	13.2	24	90.7	92.2	94.3	24	1789.2	2034.0	2332.8	24
15-DEC-90	13.0	13.2	13.2	24	93.2	94.1	94.6	24	1937.8	2188.9	2329.7	22
16-DEC-90	12.7	12.9	13.0	24	91.3	92.2	92.9	24	1948.3	2134.3	2243.9	23
17-DEC-90	12.7	12.8	12.9	24	91.3	92.0	93.6	24	2253.0	2337.6	2379.7	24
18-DEC-90	12.8	12.8	12.9	24	92.1	93.0	94.4	24	2153.6	2294.6	2354.6	24
19-DEC-90	12.6	12.7	12.8	22	92.2	93.2	94.2	22	2191.7	2764.0	3550.1	24
20-DEC-90	12.6	12.7	12.8	24	89.1	90.4	92.0	24	3404.9	3451.7	3509.4	24
21-DEC-90	12.7	12.8	12.8	24	90.1	90.9	91.9	24	3244.2	3360.4	3424.8	24
22-DEC-90	12.6	12.7	12.8	24	91.0	92.2	93.3	24	2722.3	3035.4	3420.8	24
23-DEC-90	12.6	12.7	12.8	24	91.6	93.0	94.7	24	3428.8	3460.5	3595.2	24
24-DEC-90	12.5	12.7	12.9	24	92.7	93.9	95.4	24	3653.2	6061.5	9047.5	24
25-DEC-90	12.8	13.1	13.3	24	93.1	94.4	95.8	24	8854.1	9071.5	9418.4	24
26-DEC-90	13.3	13.4	13.4	24	95.3	96.0	96.6	24	9322.0	9494.8	9628.4	24
27-DEC-90	13.4	13.6	13.8	24	95.3	96.6	97.7	24	8691.3	8971.9	9280.2	24
28-DEC-90	13.7	13.8	13.9	24	97.1	97.9	98.5	24	6158.9	8154.4	8670.2	24
29-DEC-90	13.3	13.5	13.7	24	95.4	96.1	97.1	24	4807.3	5736.4	6016.9	24
30-DEC-90	13.1	13.1	13.3	24	94.3	94.8	95.7	24	4772.9	4773.9	4792.5	24
31-DEC-90	13.0	13.1	13.2	24	92.4	93.8	94.9	24	4772.9	4831.1	4871.7	24
GRAND MONTHLY MEAN	12.9	13.0	13.1		93.0	94.2	95.6		3526.8	3932.0	4297.9	

\# A day with less than 24 values.

**** No data values for that day.

@ A value for dissolved oxygen is approaching the objective. (5.0 mg/l or 60% saturation)

? Daily mean flow is below 750 cf/s.

Calibration Certification: Thomas A. Spriggs Date: March 14/91